ARIAS SOCIETY

Assam Rural Infrastructure and Agricultural Services Society

(An Autonomous Body of the Govt. of Assam)

WORLD BANK GROUP SUPPORTED

ASSAM AGRIBUSINESS AND RURAL TRANSFORMATION PROJECT (APART)

PROJECT IMPLEMENTATION PLAN (PIP)

Cum

PROJECT OPERATIONAL MANUAL

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ABBREVIATIONS AND ACRONYMS

AIF	Agribusiness Investment Fund
APART	Assam Agribusiness and Rural Transformation Project
APC	Agriculture Production Commissioner
ARCS	Audit Reports Compliance System
ARIASP	Assam Rural Infrastructure & Agricultural Services Project
ATMA	Agricultural Technology Management Agency
BPL	Below Poverty Line
BTT	Block Technology Team
CAA&A	Comptroller of Aid, Accounts & Audit
CAS	Country Assistance Strategy
CDD	Community Driven Development
CIFRI	Central Inland Fisheries Research Institute
CPS	Country Partnership Strategy
CSC	Common Service Centres
DADS	District Agricultural Development Strategy
DDD	Dairy Development Directorate
DEA	Department of Economic Affairs
DLCC	District Level Coordination Committee
DMU	District Milk Union
DOA	Department of Agriculture
DOF	Department of Fisheries
DOS	Department of Sericulture
EA	Environmental Assessment
ECP	Environmental Codes of Practice
EDGF	Enterprise Development Grant Fund
EDPF	Enterprise Development and Promotion Facility
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EOI	Expression of Interest
ERR	Economic Rate of Return
FD	Finance Department
FMM	Financial Management Manual
FMR	Financial Management Report
FRR	Financial Rate of Return
GHG	Green House Gas
GIS	Geographical Information System
GoA	Government of Assam
ICRR	Implementation Completion Review Report
IDA	International Development Association
ILRI	International Livestock Research Institute
IRRI	International Rice Research Institute
IPM	Integrated Pest Management
GOI	Government of India
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
MIS	Management Information System
MOU	Memorandum of Understanding
MSME	Micro, Small and Medium Enterprises
MTR	Mid Term Review
NCB	National Competitive Bidding
NDDB	National Dairy Development Board
NGO	Non Government Organization
NIAM	National Institute of Agricultural Marketing
NPV	Net Present Value
OM	Operations Manual
PAD	Project Appraisal Document
PCU	Project Coordination Unit
PMGSY	Prime Minister's Gram Sadak Yojna
PMIS	Project management information system
PRI	Panchayati Raj Institutions
PWRD	Public Works Roads Department
R&R	Resettlement and Rehabilitation
RARS	Regional Agricultural Research Station
SBI	State Bank of India
SHSI	Single Holistic Synergized Initiative
SME	Small and Medium Enterprises
SMU	Social Management Unit
SPCC	State Project Coordination Committee
SPD	State Project Director
STW	Shallow Tube Well
VOC	Vehicle Operational Costs
WVC	World Vegetable Centre
WF	WorldFish
WU	Wageningen University

ASSAM AGRIBUSINESS AND RURAL TRANSFORMATION PROJECT (APART)
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EXECUTIVE SUMMARY

1. **Background**: About 90 percent of Assam's population lives in rural areas[1] and is mostly dependent on agriculture for their livelihoods. The Agriculture and allied sector plays a significant role in providing livelihood support to more than 75 percent of the population of the State[1], providing employment opportunities to more than 50 percent of total workforce. Agriculture in Assam is mostly tradition based where it is characterized by certain key constraints in its structural transformation like - lack of proper storage facility, processing facilities of the food produced, constrained market access, fragmented supply chain of inputs, low level of private sector involvement, underdeveloped knowledge and awareness among the farming community on markets and climate change, lack of scientific post-harvest management practices, compounded by the dated regulatory framework of agricultural marketing.

2. The recently concluded World Bank funded Assam Agricultural Competitiveness Project (AACP) was successfully implemented with overwhelming achievements in increasing cropping intensity, on-farm productivity, and diversification of agriculture in the State[1]. Under the project, where increased production and productivity remained the thrust outcome, productivity of the crops like rice, cabbage and other food crops gained substantial momentum. The area under high value crops like vegetables and oil seeds reflected an increase of 17-35%[2]. Thus, AACP has laid the foundations for long term agriculture transformation in Assam by shifting the focus from rice production towards diversification into high value agriculture production (vegetables, spices, fish, pork, dairy etc.). This move towards higher value products offers opportunities to increase contribution of agriculture to Assam's growth.

3. In the above context the GoA proposed to take up a project titled "***Assam Agribusiness and Rural Transformation Project (APART)***". The Project Development Objective (PDO) is to "add value and improve resilience of selected agriculture value chains, focusing on smallholder farmers and agro-entrepreneurs in targeted districts of the State of Assam**"**. The project would achieve the PDO by: (i) enabling investments in agri-enterprises, improving the investment environment and investment promotion, facilitating access to finance for agribusiness enterprises, and, where appropriate, pushing for process, regulatory changes; (ii) facilitating the growth of agri enterprise clusters to increase competitiveness, revenue and employment growth; and supporting development of a modern supply chains; and (iii) fostering the development of climate resilient production clusters, and improving producer access to knowledge, technologies, markets, and infrastructure so that they are able to respond to market opportunities and climate variability.

4. **PDO Level Results Indicators:** The Key Project Indicators (KPI) will be: (a) Farmers reached with agricultural assets or services (number), of which female (percentage). (Corporate Results Indicators); ***Value add measured by***: (b) Increase in price premium of commodities sold by beneficiaries in the selected value chains; (c) Share (%) of selected commodities sold through new marketing channels ; ***Resilience measured by***: (d) Farmers adopting improved agricultural technology(climate resilient) (gender disaggregated). (Corporate Results Indicators)

5. The project would support, value addition in the production and post-harvest segments of selected agriculture value-chains; facilitate agribusiness investments through inclusive business models

[1] www.assam.org/Assam **Poprtal/The Agri Sector in Assam:Its Importance**
[2] AACP ICR Report, 2.12.2015

that provide opportunities to smallholder farmers as well as stimulate the establishment of new small and medium agribusiness enterprises; and support resilience of agriculture production systems in order to better manage increasing production and commercial risks associated with climate change, in the targeted districts. The project would adopt a cluster strategy within the targeted districts to generate economies of scale; promote vertical and horizontal links between local agricultural enterprises; enable diffusion of innovations; leverage network externalities; and channel public support for services and infrastructure. By adopting a cluster approach, the project would enable all the value chain participants to develop competitive and innovative products that meet market demands rapidly and successfully.

Three World Bank Global Practices – Agriculture, Trade and Competitiveness, and Finance and Market – are collaborating on the Agribusiness and Rural Transformation Project to ensure that the GoA's initiatives benefit from innovations and global knowledge. During implementation, this collaboration would be further strengthened to support GoA's initiatives on creating an enabling investment climate for agribusinesses and other enterprises; and using IFC's "Business Edge" tool kits for agribusiness MSMEs. Furthermore, the project is collaborating with the Consultative Group on International Agricultural Research (CGIAR) centers namely *International Rice Research Institute (IRRI), WorldFish (WF), International Livestock Research Institute (ILRI), and World Vegetable Center (WVC)* as well as *Wageningen University and Research Center* (as part of the MoU signed between the Government of the Netherlands and the World Bank).

6. The Assam Rural Infrastructure and Agricultural Services (ARIAS) Society formed in November 1998, as an autonomous body under the Government of Assam (GoA) was the Project Coordination Unit (PCU) for AACP. The Society is headed by the Chief Secretary, GoA, as its President (Project Guidance Council) and the Agriculture Production Commissioner, GoA is the Chairperson (Governing Body). The Project Coordination Unit (PCU) is the headquarter of the Society, which is headed by a State Project Director. GoA has decided that ARIAS Society will be PCU for APART.

7. Components and sub-components:

(a) ***Component A***: **Enabling Agri Enterprise Development:** The objective of this component is to enable investments in agri-enterprises, improving the investment environment and investment promotion, reducing business and transaction costs, facilitating access to finance for agribusiness entrepreneurs, and, where appropriate, facilitate process, and regulatory changes. This would be achieved by: (i) strengthening the newly established Assam Bureau of Investment Promotion (ABIP) to market investment opportunities in the state and provide promotion, facilitation and aftercare services, in collaboration with other relevant entities, for stimulating investment in agribusiness; (ii) setting up Enterprise Development and Promotion Facility (EDPF) to foster and accelerate growth of agro-processing sector, with specific focus on MSMEs; (iii) facilitating the establishment of an Investment Fund[3] to provide risk capital (equity/quasi-equity financing); and (iv) establishing sector stewardship councils to anchor the development of coherent policy framework and effective support measures for the development of select value chains.

(b) ***Component B***: **Facilitating Agro Cluster Development:** The objective of this component is to enhance competitiveness of agri enterprises in specific geographic cluster, and upgrade infrastructure for agricultural trade, in these clusters to enable producers and other value chain participants to access new markets. The component will use a geographically targeted approach by focusing project interventions on clusters of agri-enterprises so as to enable an increase both in the number of such enterprises and in their scale of operations. Interventions under the component will include (i) mobilizing

[3] Under SEBI's 2012 Alternative Investment Fund regulation

proximate agri-enterprises in identified geographic clusters into Industry Associations (ii) supporting development of and financing for Agro Industrial Development Plans (IADPs) laying out joint actions that can be undertaken by IAs to enhance competitiveness; (iii) providing a range of Business Development Services to scale up agri-enterprises in the selected clusters ; and (iv) upgrading and modernizing warehouses, agricultural wholesale markets and rural periodic markets in the cluster, including improving link roads.

(c) ***Component C***: **Fostering Market-led Production and Resilience Enhancement**: The objective of this component is to enable producers of the priority value chains, in the targeted clusters, to take advantage of the rapidly changing market demand, and enhance resilience of agriculture production systems for increasing production and managing risks associated with climate change. This would be achieved by: (i) improvements in production technologies and management practices through climate resilient solutions; (ii) facilitation of collective-action by producers by supporting the establishment of farmer producer organizations (FPOs); (iii) improving value realization at the farm level through improved cleaning, grading and packing of produce through common service centers (CSCs) managed by FPOs; and (iv) facilitating access to a broad set of financial services and their responsible use by producers. The component will adopt a cluster-based value-chain approach for providing support to producers for sustainably increasing their production and productivity; linking the producers with emerging supply chains, modernized wholesale agriculture markets and warehouses, under component B; and facilitating partnership opportunities with strategic and potential anchor and leading firms, supported under Component A.

(d) ***Component D***: **Project Management, Monitoring and Learning:** This component will ensure effective implementation of the project activities, and monitor and evaluate project implementation progress, outputs and outcomes, building on implementation experience of AACP. The component will support: (i) establishment and operations of a Project Coordination Unit (PCU), which will oversee and coordinate activities of the implementing agencies of the project; (ii) establishment and operations of Project Implementation Units (PIUs) in the respective implementing agencies; and (iii) setting up a Monitoring and Evaluation (M&E) system for the project, including a project management information system, and contracting an external M&E agency to monitor project activities and impact evaluation. This component will also finance dedicated staffing for the project activities, consultancies, training and related material, office equipment, and incremental operational costs. The Project will provide investment and technical support for the establishment of a sound management information system and information and communication technology (ICT) systems and accompanying capacity strengthening of key personnel

8. Component wise key outcomes:

(a) **Enabling Agri Enterprise Development**:

i) Number of agribusiness investments facilitated through the Assam Bureau of Investment Promotion (ABIP) is pegged to be around 300.

ii) Number of enterprises supported by Enterprise Development and Promotion Facility (EDPF) will be around 1500. Out of this around 1200 will be covered in short term support, 300 will be covered in business development support. 15 enterprises will be covered in intensive incubation support.

iii) The private sector investment targeted to be leveraged by Agribusiness Investment will be around 50 million USD i.e. roughly around Rs. 340 crores to be invested in around 10 companies over a 12-15 year period (conversion rate: 1 USD=INR 68).

(b) **Facilitate Agro Cluster Development:**

i) Number of joint actions taken by firms in an enterprise clusters is pegged at 300 over the project period. The major joint decisions envisaged are in the areas of participation in trade fairs, marketing and branding decisions, exposure visits and technical service delivery projects. Leaving these four major action areas, there may be other areas also where joint actions could be taken.

ii) The firms in the agro enterprise clusters would be registered as Industry Associations (IAs). Around 150 firms will be brought together in one IA. It is planned that of the 2000 firms available, around 1000 will be registered in IAs in the 2nd year itself, while remaining will be registered in the 3rd year of the project.

iii) Industry Associations (IAs) in the enterprise clusters are expected to prepare their own joint business plans for growth and development of the cluster. This plan will be known as District Agro Industrial Development Plan (DAIDP). The objective would be to have seven plans ready in the 2nd year of the project and 17 (cumulative) in the 3rd year of the project.

iv) The project interventions will also be in the areas of emerging financial/credit instruments for farmers/traders etc. To this end, system of electronic Negotiable Warehouse Receipts (e-NWRs) will be channelized by State Warehousing Corporation in around 33 of its accredited and registered warehouses in association with commercial banks. It is planned that around 25000 eNWRs will be issued by these warehouses over the project period and these are expected to generate a financing volume of INR 26 crores (3.8 million USD); conversion rate- 1USD=INR68.

v) As the infrastructure and facilities in around 75 physical markets (APMC and Rural Haats), along with access roads will be augmented, it is envisaged that there would be increase in arrivals in these markets. Hence, trading volume in these markets is expected to increase by a factor of 20% over the project period.

vi) About 100 km road improvement work will be taken up in the project to ensure connectivity to the clusters, markets, warehouses, common service centres, etc. No new roads will be taken up in the project.

(c) **Market Led Production and Resilience Enhancement:**

i) The focus of production related interventions would be on climate resilient technologies/practices being adopted by farmers. It is targeted to demonstrate around 25 climate resilient technologies in the project areas over the project period.

ii) In the production clusters, farmers would be organized into Farmer Producer Organizations (FPOs). Around 100 FPOs are expected to be formed in the first three years of the project. The FPOs are expected to be sustainable and fully functional by 4th year of the project. The number of farmers to be mobilized into FPOs will be around 40,000 (roughly 400 farmers /FPOs).

iii) After the creation of CSCs, FPO produce is expected to move through the CSCs, there would be considerable increase in the FPO produce throughput in CSCs. The increase in throughput would be variable across the commodities and details are provided in respective chapters. In addition to this, farmers will also be benefitted through market intelligence services provided by the Market Intelligence Cell (MIC) to be housed in Assam State Agricultural Marketing Board (ASAMB).

iv) Around 1,25,000 producers are expected to be reached with access to financial services. Out of these around 30% would be females. This would be achieved through financial education, counselling and tie ups with banks and other financial institutions for providing such services.

(d) **Project Management, Learning and Monitoring:**

i) An external M&E Agency is being hired for monitoring and evaluation of the project activities. The reports will be provided to the project authorities on annual basis, midterm basis and final assessment.

ii) The project will put in place a robust MIS System, with seamless communication from blocks, district level teams to District Level Coordination Committee, PCU, Operational PIUs and Core PIUs. Horizontal communication between departments, sectoral teams will also be ensured for bringing in synergies, efficient discharging of cross cutting activities and also to ensure that there is no duplication of efforts and proper convergence with other schemes etc. The MIS system will be backed by a strong IT team at the PCU and supporting staff in PIUs and at district level.

iii) Learning from the past projects completed by the society, will be used in implementation of the APART. For example, a strong need of seamless communication was observed between the Departments at the Secretariat level and Directorate level in AACP which slowed down the pace of project activities. This has been addressed in the APART by way of two PIUS i.e. a Core PIU at Secretariat level and an operational PIU at Commissionerate/Directorate/Agency level.

9. International Best Practices and Knowledge Partnerships: A large number of international organizations will be involved in the project mainly as knowledge partners. These partnerships tentatively intended for the entire project duration (except in case of Wageningen University, where it will be maximum for 4-5 years). However, these will be reviewed at mid-term. Details of international organizations which are likely to involve in the project are listed below-

(a) International Livestock Research Instituted (ILRI) will support the Department of Animal Husbandry and Veterinary on the pig value chain and also Directorate of Dairy Development on the Informal milk sector interventions.

(b) International Rice Research Institute (IRRI) will support the Department of Agriculture and Assam Agricultural University mainly in the development and introduction of stress tolerant varieties for flood/submergence, crop management practices, mechanization etc

(c) World Vegetable Centre (formerly Asian Vegetable Research Development Centre) will be supporting the project mainly in the vegetable value chains in the areas of production as well as post harvest management.

(d) Wageningen University and Research Centre will be roped in mainly for support in agro logistics and supply chain management for perishables like fruits and vegetables and non perishables like maize and mustard (for moisture management).

(e) WorldFish will be roped in the project to support Department of Fisheries

10. Project Districts: The project will be implemented over seven years in the districts identified through using two criteria, namely: (i) contribution of the district to the agriculture GSDP of the state; and (ii) number of MSME units in districts, as a proxy for industrial activity at a district level. All the 33 districts of Assam were ranked, based on these criteria, and the top 16 districts (Undivided)[4] have been prioritized namely: Nagaon, Sonitpur, Barpeta, Karbi Anglong, Kamrup, Dhubri, Golaghat, Kokrajhar, Lakhimpur, Darrang, Cachar, Sivasagar, Jorhat, Goalpara, Morigaon and Nalbari.

11. Prioritized value chains: A set of indicators were developed for identifying priority commodities in agriculture and allied sectors. The indicators include: (i) relevance of the commodity for the domestic

[4] As on 1st April, 2016

market, and the potential for import replacement (from other states); (ii) synergy potential between commodities; (iii) commodities with significant value and prospect for value addition; (iv) private sector-producer linkages; and (v) participation of wider beneficiaries. Following field investigations, consisting of interviews and observations, and stakeholders consultations facilitated in arriving at a well-informed prioritized value chains viz.: (i) Fruits and Vegetables (Tomato, Cucurbits, Banana, Potato); (ii) Livestock and Fisheries (Pork, Milk, Fish); (iii) Pulses (Lentil, Blackgram); (iv) Spices and Condiments (Ginger, Turmeric, Mustard); (v) Cereals (Rice, Maize); and (vi) Specialty value chains (Muga, Eri, Silk)**.**

12. Implementing arrangements/ Agencies: The implementation arrangement would be:

(a) **Core Project Implementation Units (CPIU) at the Secretariat level**: Total eight CPIUs in each of the eight line departments of APART, headed by Senior most secretaries of the concerned Deptts. have been structured by the concerned Admin. Deptts. A Joint Secy./Deputy Secy. level officer in each CPIU will be the Coordinator. The operational and other expenses of the CPIU including for one Computer Operator and one technical staff hired on contract basis will be supported under the project. The CPIU will monitor & coordinate the project activities. This arrangement is considered for better ownership and acquaintance of the APART in the Administrative deptts. and for bringing synergies with other schemes.

(b) **Operational PIU (OPIUs) at the Directorate/HOD level**: Total fifteen OPIUs are being structured in the Directorate/HQ of each of the implementing line Deptts/agencies. The OPIUs will be headed by the concerned HOD and one designated Nodal Officer in each OPIU will be responsible for day-to-day coordinating with the CPIU, PCU, DLCC etc. The operational and other expenses of the OPIU will be supported under the project including for staff hired on contract basis (e.g. technical, procurement, accounts, social, environmental, computer related etc. as per need and as agreed with the World Bank).

CPIUs in the Administrative Departments	Operational PIUs in Commissionerates/Directorates/HODs/HQ of Agencies
1. Agriculture	1. Directorate of Agriculture
	2. Directorate of Horticulture & Food Processing
	3. Assam State Marketing Board (ASAMB), Guwahati
	4. Assam Agricultural University (AAU), Jorhat
2. Industries & Commerce	5. Commissionerate of Industries & Commerce
3. Animal Husbandry & Veterinary	6. Directorate of Animal Husbandry & Veterinary
	7. Directorate of Dairy Development
	8. Livestock & Poultry Corporation Ltd (ALPCO), Guwahati
4. Cooperation	9. West Assam Milk Union Limited (WAMUL), Guwahati
	10. Assam State Warehousing Corporation (ASWC), Guwahati
5. Fisheries	11. Directorate of Fisheries
6. Handloom, Text. & Sericulture	12. Directorate of Sericulture
	13. Directorate of Handloom & Textiles
7. Public Works (Roads)	14. Chief Engineer (World Bank aided Projects), Public Works Roads Deptt.
8. Panchayat & Rural Development	15. Commissionerate of Panchayat & Rural Development

(c) **District Level Coordination Committees (DLCCs):** DLCCs are being structured for all the 16 undivided districts for monitoring and coordinating of the project activities in the respective districts. It will be headed by the DC and the ADC (Development) will be the Member Secy. The District Level offices of the implementing Agencies, representatives from the lead commercials banks in the District will be the members. The operational and other expenses of the DLCC will be supported under the project including for an MIS Operator and one/two support staff hired on contract basis. The notification for structuring DLCC is being notified by the Agriculture Deptt., being the nodal Department of APART.

(d) The concerned district level officers of the implementing Deptts./Directorate/Agencies will be responsible for implementation of the assigned project activities at the ground level. The incremental operational and other expenses of these offices will be supported under the project.

13. Social & Environmental management

(a) **Social**: To ensure Social Safeguard issues of the project, Social Assessment has been undertaken for identification of potential social issues and risks through consultations and surveys. Based on the assessment, Social Management Framework (SMF) has been prepared to address social risks and enhance benefits that build on the principles of social inclusion, participation, transparency, accountability and land use. It will ensure that the implementation of the project is in compliance with the Operational Policies of World Bank – Indigenous People (OP/BP 4.10) and Involuntary Resettlement (OP 4.12). The Social Management Framework has the due diligence process for land, strategies on gender and indigenous people involvement, consultation and communication framework, mechanism for addressing grievances, citizen feedback and social audit as well as institutional framework and monitoring indicators. To oversee the compliance of the project with the SMF, the PCU will be having a dedicated Social Management Unit (SMU) with professionals at state level and district level. Disaggregated data of the beneficiaries will be gathered to monitor the impact of the project on women, marginalized communities and indigenous people.

(b) **Environmental:** As part of project preparation, an Environmental Assessment Study has been undertaken with an aim to provide inputs into the design of APART in accordance with the World Bank Operational Guidelines and policies including Environment Assessment (OP/BP/GP/4.01), Natural Habitats (OP/GP 4.04) and Pest Management (OP 4.09). It involves identification of key environmental issues arising out of the project activities and mainstreams the environmental management measures in all stages of the project cycle. Based on the study, Environmental Management Framework (EMF) has been developed to ensure that: Environmental considerations are fully mainstreamed in project planning, implementation and monitoring, and potential adverse impacts are adequately mitigated and potential benefits of the project are further enhanced to improve the effectiveness and sustainability.

14. Project Financing: The project will be financed through a seven year Investment Project Financing (IPF) from the World Bank (IBRD). The total project cost is **US$ 262.40 million** and will be funded by an **IBRD loan** (**US$200.0 million** equivalent), the **GoA (US$50.8 million** equivalent), and **beneficiary contributions (US$ 11.6 million** equivalent). An IPF was selected as the lending instrument given that the investment is well defined and is to be implemented over a finite time period. The GoA has sought retroactive financing, not exceeding **US$20 million**, for project related work undertaken by the borrower during the project preparation, in advance of effectiveness. This includes preliminary surveys, consultancies for preparation studies, incremental staff and operating costs for the Project Coordination Unit (PCU), equipment and minor upgrading of project office, workshops, project-related travel, etc. Summary of project costs are as given below:

Project Components	Project cost		IBRD Financing		% IBRD Financing	% of Total Project Cost
	INR Rs. Cr.	USD Mil.	INR Rs. Cr.	USD Mil.		
A: Enabling Agri. Enterprise Development	250.24	36.80	163.20	24.00		14.0%
B: Facilitate Agro Cluster Development	507.28	74.60	393.04	57.80		28.4%
C: Market Led Production and Resilience Enhancement	903.04	132.80	703.80	103.50		50.6%
D: Project Management, Monitoring and Learning	120.36	17.70	96.56	14.20	76.2%	6.7%
Total	**1780.92**	**261.90**	**1356.60**	**199.50**		99.8%
Add: Fron-End Fees @0.25% of loan amount	3.40	0.50	3.40	0.50		0.25%
Grand Total	**1784.32**	**262.40**	**1360.00**	**200.00**		100.0%

15. Procurement & Financial Management

(a) **Procurement Management:** The project will follow the provisions of World Bank Procurement Framework 2016 and all Procurement will be carried out in accordance with the World Bank's guidelines. The project procurements will adhere to the Procurement Regulations for IPF Borrowers as stipulated in the "PROCUREMENT IN INVESTMENT PROJECT FINANCING Goods, Works, Non-Consulting and Consulting Services, July 2016" published by the World Bank and the provisions stipulated in the Legal Agreement. The Project would be subject to the Anti-Corruption Guidelines: the "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants." Published by the World Bank.

A Project Procurement Strategy for Development (PPSD) has been prepared. The project procurements will be under the new online procurement monitoring tool of the World Bank viz. STEP (Systematic Tracking of Exchanges in Procurement). Procurements will be undertaken as per the World Bank approved Procurement Plan Dated 19th July 2017 (and as updated with approval of the World Bank). It is envisaged that given the past experience and the core capacity created in the PCU, implementation of the procurement program will be mainly lead by the ARIAS Society with all works contracts delegated to the PIU (PWRD) and procurement upto USD50,000 delegated to other implementing agencies. Project will continue with its successful experience with community based procurement and an innovative mobile based application is being developed for providing appropriate market and item details to the community groups. The project will use e-procurement system of the National Informatics Centre (NIC) e-procurement system for all contracts above Rs.20.0 lakhs (except for the consultancy contracts). The implementing agencies which are not familiar with the e-procurement will be trained by the NIC on the use of the system.

(b) **Financial Management (FM):** The Financial management of the project will be done as per the Financial Management Manual (as agreed with the World Bank) for the project and parent-child accounting system of the ARIAS Society will be core to the FM plan. The fund requirement for the project (both GoI/World Bank share and counterpart share of GoA) will be budgeted under a separate budget head in the State Government's budget for the Agriculture Department. A detailed work plan for the Project will be the basis for the annual budget provision. SPD would be authorized as DDO to draw the funds from the budget, subject to approval by Finance Department.

Annual Work Plan (AWP) and Bank Accounts: The AWP for a Financial Year (April to March) will be prepared in the preceding FY, based on targets in the approved Procurement Plan of the project. The PCU will place the AWP for a FY before the Governing Body of ARIAS Society for approval. SPD will open Bank Account or Accounts, as may be necessary, in any Nationalised Commercial Bank(s)/ Scheduled Banks in the name of the ARIAS Society. All these accounts will be operated under the joint signatures of the SPD and the Chief Finance Officer of PCU.

Sanction and Fund Release Procedure: PCU will release funds to the identified and notified Drawing and Disbursing Officers (DDO) for APART through parent child accounting system. The DDOs as identified by ARIAS Society will open and maintain a child account in the commercial Bank designated by ARIAS Society for making eligible expenditures under the project. All these Bank Accounts will be operated under the joint signature of the DDO and the senior most Accounts official in the DDO's office. Based on the Administrative Approval accorded to the AWP, DDOs will move the PCU directly for schematic/ activity wise sanction proposal(s). PCU will issue fund limit order directly to the DDOs with intimation to the concerned implementing departments/directorates/HODs. Any fund flow to the individual beneficiaries/community groups will be in tranches and for community procurement (eg. CSCs), first the beneficiary part will be spent.

Audit and Accounts: The accounts of the PCU/ DDOs will be audited by Statutory Auditors of ARIAS Society. The annual accounts of the PCU/ DDOs will be audited by Independent External Auditors hired by Society (CA firm). The annual accounts of the line department may also be audited by the Accountant General, Assam as done for all Government expenditures. The Community Groups supported by the project will also be subject to audit.

16. Conclusion: Over the seven year period,

(a) The project plans to make a positive difference in the lives of at least 5 lakh farmers by reaching out to them with agricultural assets or services over a seven year period. These farmers would be from all agri and allied production sectors like agri-horti, pork, milk, silk and fisheries. The focus here would on climate resilient innovations/practices.

(b) The project has a strong gender focus. At least 30% of the farmer beneficiaries will be women or women headed farm households on a cumulative basis.

(c) There would be quality enhancement by way of agri produce being sold through CSCs. CSCs would provide primary processing facilities to famers on group basis. It is aimed that there would be at least 25% enhancement in the quality of agri produce being sold by farmers across the selected value chains. This will be measured by price premium gained by beneficiary farmers.

(d) The number of farmers adopting improved agricultural technologies, is targeted to be around 3.6 lakhs and out of this around 30% (or 1.20 lakhs) will be female farmers or female headed farming households.

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ASSAM AGRIBUSINESS AND RURAL TRANSFORMATION PROJECT (APART)
PROJECT IMPLEMENTATION PLAN (PIP)

Introduction

1. In Assam, agriculture and allied sectors are the principal occupation of the vast majority of rural population in terms of employment and livelihood. About 90 percent of state's population lives in rural areas and is mostly dependent on agriculture for their livelihoods. The Agriculture and allied sector of plays a significant role in contributing support to more than 75 percent of the population of the State, providing employment opportunities to more than 50 percent of total workforce[5]. With a rural based agrarian economy, agricultural sector, directly or indirectly supports majority of the rural households, both in terms of livelihood and employment opportunities.

2. Agriculture of Assam is mostly tradition based where it is characterized by certain key constraints in its structural transformation like - lack of proper storage facility, processing facilities of the food produced, constrained market access, fragmented supply chain of inputs, low level of private sector involvement, underdeveloped knowledge and awareness among the farming community on markets and climate change, lack of scientific poor post-harvest management practices, compounded by the dated regulatory framework of agricultural marketing.

3. Today, with the rapid pace of urbanization and rise in increasing demand for high value commodities in the consumer food basket, the traditional agriculture of Assam requires to be blended with technology to gain its agricultural productivity and transform agriculture to agribusiness. Through agribusiness, agricultural activities can be shifted to a more diversified network of food production that would meet the requisite consumers' demand for commodity consumption.

4. The recently concluded World Bank funded Assam Agricultural Competitiveness Project (AACP) was successfully implemented with overwhelming achievements in increasing cropping intensity, on-farm productivity, and diversification of agriculture in the State. Under the project, where increased production and productivity remained the thrust outcome, productivity of the crops like rice, cabbages and other food crops gained substantial momentum. The area under high value crops like vegetables and oil seeds reflected an increase of 17-35%. Thus, AACP has laid the foundations for long term agriculture transformation in Assam by shifting the focus from rice production towards diversification into high value agriculture production (vegetables, spices, fish, dairy etc.). This move towards higher value products offers opportunities to increase contribution of agriculture to Assam's growth.

5. Transition to high value commodities and opportunities in agro-food processing underscores the enormous potential for commercialization and income growth in agriculture as production, consumption and trade shift from traditional food crops to horticulture and other high value commodities. This transition would pose certain key challenges for the farming communities in Assam, e.g.:

(a) Most high value commodities are perishable and therefore carry greater production and market risks, and the absence of well-developed supply chains makes the access to nearby urban markets costly. The underdeveloped agriculture market and agro logistics in Assam need greater infusion of technology, good supply chain practices and market intelligences to promote efficiency. Reforms are needed not only to harmonize the regulatory regime in the state, but also for the development of alternative marketing options for farmers.

(b) The AACP has successfully introduced the Agricultural Technology Management Agency (ATMA) model, a participatory, decentralized planning, funding and implementation of technology

[5] Economic Survey of Assam, 2014-15

dissemination to district, block and village levels in partnerships with farmer groups, and different line departments. While the ATMA platform has introduced improvements in technology transfer and demand driven extension, the current approach focuses mainly on production related issues. Therefore, ATMA's capacity needs to be strengthened towards market-led production and post-harvest practices, as growing specialized commodities in a market led and climate resilient manner would require modern technologies, quality inputs, support services, capital, and timely information.

(c) Despite having a comparative production advantage in many of the agriculture and allied commodities, and emerging marketing opportunities, conversion of this advantage into competitive food processing industries has remained a challenge in Assam. The food processing sector in the State is largely unorganized and operates on a small scale. Facilitating the development of organized MSMEs would require handholding, business facilitation services, and facilitation of access to financing, along with regulatory changes for them to flourish.

(d) The financial services sector in Assam is less developed in comparison to other states. Some of the identified challenges include: underdeveloped agribusiness value chains; limited availability of crop-insurance etc. While the Private Equity/Venture Capital industry in other states has rapidly grown over the past decade, this industry is barely active in Assam.

6. Assam with its unique physiography and climate vis-à-vis its location in the North Eastern Himalayas with mighty Brahmaputra flowing through the State, faces increased unpredictability of weather patterns and is subjected to recurrent floods as well as droughts. Currently, over 50% of the paddy growing areas are prone to stresses including flooding/submergence and drought. Thus, sustainability of agriculture & allied sectors will require improved resilience against climate change risks.

7. Government of Assam (GoA) recognizes that creating conditions for agriculture based rural transformation in long term would require focus on: (i) value addition in the post-harvest segments of agriculture value-chains; (ii) climate resilient change production systems; and (iii) facilitating a conducive environment for evolving a dynamic agri-business and enterprise sector in Assam. Towards this, GoA has launched a number of policy changes, initiatives, and programs, which *inter alia* include (i) enacting the Assam Ease of Doing Business Act, 2016; (ii) launching of the Chief Minister's Samagra Gramya Unnayan Yojana (CMSGUY) for 5 years (2016-17 to 2021-22), with the objective of doubling the farm income in the state; and (iii) delisting of the fruits and vegetables from the Assam State Agriculture Produce Marketing (APM) act, thus paving way for the development of alternative marketing arrangements in the state .

8. In the above context and background the GoA proposed to take up a project titled "Assam Agribusiness and Rural Transformation Project (APART)". The project would support, value addition in the production and post-harvest segments of selected agriculture value-chains; facilitate agribusiness investments through inclusive business models that provide opportunities to small farmers as well as stimulate the establishment of new small and medium agribusiness enterprises; and support resilience of agriculture production systems in order to better manage increasing production and commercial risks associated with climate change, in the targeted districts. The project would adopt a cluster strategy within the targeted districts to generate economies of scale; promote vertical and horizontal links between local agricultural enterprises; enable diffusion of innovations; leverage network externalities; and channel public support for services and infrastructure. By adopting a cluster approach, the project would enable all the value chain participants to develop competitive and innovative products that meet market demands rapidly and successfully.

Project Development Objective (PDO)

9. The Project Development Objective (PDO) is to "add value and improve resilience of selected agriculture value chains, focusing on smallholder farmers and agro-entrepreneurs in targeted districts of the State of Assam**"**.

10. The project would achieve the PDO by: (i) enabling investments in agri-enterprises, improving the investment environment and investment promotion, facilitating access to finance for agribusiness enterprise, and, where appropriate, pushing for process, regulatory changes; (ii) facilitating the growth of agri enterprise clusters to increase competitiveness, revenue and employment growth; and supporting development of a modern supply chains; and (iii) fostering the development of climate resilient production clusters, and improving producer access to knowledge, technologies, markets, and infrastructure so that they are able to respond to market opportunities and climate variability.

11. **PDO Level Results Indicators:** The Key Project Indicators (KPI) will be: (a) Farmers reached with agricultural assets or services (number), of which female (percentage). (Corporate Results Indicators); ***Value add measured by***: (b) Increase in quality as measured by price premium of commodities sold by beneficiaries in the selected value chains; (c) Share of selected commodities sold through new marketing channels; ***Resilience measured by***: (d) Farmers adopting improved agricultural technology (gender disaggregated). (Corporate Results Indicators)

Project Design

12. The guiding principles under the project are: (i) focus on cluster based approach to bring forth Assam's comparative advantage to meet the growing domestic, regional and the potential international demand; (ii) increase private sector participation in the development of agriculture supply chains and markets; and (iii) improve public sector capacity in delivering climate resilient technology transfer and related services.

13. The project is designed to support, value addition in the production and post-harvest management of selected agriculture value-chains; facilitate agribusiness investments through inclusive business models that provide opportunities to small farmers and enable establishment of new agribusiness SMEs; and support resilience of agriculture production systems in the targeted districts for better manage increasing production and commercial risks associated with climate change. The project would adopt a cluster strategy, to generate economies of scale; promote vertical and horizontal links between local agricultural enterprises. By adopting a cluster approach, the project would enable all the value chain participants to develop competitive and innovative products that meet the market demands

14. The project is designed for a transformational impact on rural poverty through improved agricultural productivity, value-addition, higher non-farm employment opportunities and increased farmers income. It will facilitate better inclusion of the poorer and marginalized communities in the growth process through better access to markets, jobs, growth opportunities, and services. One of the major thrust of APART will be on enhancing agglomeration of producers to improve economies of scale in producing, processing and marketing of agricultural produce. Corresponding to this, the project will support agriculture and livestock productivity (including value and incomes) through essential technology transfer in production and improved post-harvest and market operations. APART will support the development of higher value commodity supply chains for structural transformation of the agrarian-economy. Project will focus on food processing, agribusiness, logistics and infrastructure, and MSME finance and insurance and will establish a new standard of excellence for entrepreneurship and business skills training by improving skills and knowledge transfer from trainers to MSMEs.

15. By simultaneously intervening along multiple dimensions of the growth nexus (business environment, key infrastructure, access to basic services including finance, local governance), the proposed project aims to remove key constraints to business development and strengthen the platform for growth in agriculture and allied sectors within targeted districts. By doing so, it will contribute to the GoA's strategic objectives related to faster and broader agriculture sector growth and inclusive development.

16. Project Beneficiaries: Project beneficiaries will include farmers, farmer producer organizations, and entrepreneurs especially in the MSME segment in the targeted districts. Smallholder farmers account for over 70 percent of the rural population and make up for the vast majority of the state's poor. It is estimated that about 500,000 farming household will directly benefit from the project activities. Indirect beneficiaries will include those who benefit from technologies demonstrated by the project, farmers whose produce goes through rehabilitated markets, and farmers accessing negotiable warehouse receipt financing, etc. At least 30 percent women participation is expected in project activities. Staff of the participating line departments and autonomous institutions will be among the indirect beneficiaries of the technical and institutional capacity building interventions under the project.

17. Project districts. To identify the targeted project districts, agriculture production and economic concentration of industrial activities in all the districts of Assam were analyzed. The prioritization of the districts has been done by using two criteria namely: (i) contribution of the district to the agriculture GDP of Assam; and (ii) number of MSME units in the districts (as a proxy for industrial activity at a district level). All the 33 districts (undivided as on April 1, 2016) were ranked, based on these two criteria and the top 16 districts were selected viz.: Nagaon, Sonitpur, Barpeta, Karbi Anglong, Kamrup, Dhubri, Golaghat, Kokrajhar, Lakhimpur, Darrang, Cachar, Sivasagar, Jorhat, Goalpara, Morigaon and Nalbari. Implementation of the project will be over a period of seven (7) years in the targeted districts.

18. Cluster based approach:

(a) Considering the current production and processing hubs of agriculture and allied commodities, practices of trade & commerce prevailing, a two pronged cluster development strategy has been envisaged , viz.

(i) **Production Clusters**: Contiguous geographical locations wherein cultivation/rearing of agriculture and allied commodities are being practiced as a primary livelihood en-large by the domicile population resulting in an aggregated yield of commercially viable volume which are being connected to the market/processors/consumers in a consistent manner. This will help in achieving economies of scale through aggregation of produce and primary processing and its sale through CSCs managed by FPOs.

(ii) **Enterprise Cluster**: Business entities/entrepreneurs which are actively involved in operations related to handling and primary value addition of agriculture and allied commodities on a commercial scale, based closest to the Production Clusters and utilizing the locally grown/reared material as a primary raw material. This will help in achieving economies of scale. Such economies of scale benefits include access to skilled labour; sharing of common service facilities such as research & development, information networks, marketing and branding; and common infrastructure such as effluent treatment plants, warehousing facilities. Examples of economies of scope include sharing of business functions and costs, such as cooperation between firms in marketing; cross-selling related products; and the outputs of one business being used as the inputs into another. The objective of cluster-based interventions under the project is to increase the number and scale of operations of agribusiness enterprises in selected geographic locations that are already exhibiting economic growth and increase in enterprise formation.

After collection of data in project districts, existing agri-enterprises (registered and unregistered) have been identified and the same are being mapped geo-spatially.

19. Prioritized value chains. A set of indicators, both quantitative and qualitative, was used for identifying the priority commodities in agriculture and allied sectors to be initialy taken up under the project. The indicators include: (i) relevance of the commodity for the domestic market (Assam and neighbouring states), and the potential for import replacement (including from other States); (ii) synergy potential between commodities (e.g. maize and mustard by products are critical for the livestock and fish feed sectors); (iii) commodities with significant value and prospect for value addition; (iv) private sector-producer linkages; and (v) participation of wider beneficiaries. Field investigations, consisting of interviews and observations, were also carried out for a holistic assessment of the identified commodities. In addition, wide ranging stakeholder consultations were also carried out to validate the findings. This process resulted in arriving at a well-informed prioritized value chains, which are also supported by the concerned value-chain stakeholders: (i) Fruits and vegetables (tomato, cucurbits, banana, potato); (ii) Livestock and fisheries (pork, milk, fish); (iii) Pulses (lentil, black gram); (iv) Spices and condiments (ginger, turmeric, mustard); (v) Cereals (rice, maize); and (vi) Specialty value chains (muga, eri, silk). Based on project performance, during implementation, additional districts and new value chains are to be considered after a due process of validation in consultation with the World Bank.

20. Value Chain Analysis (VCA) and Value Chain Development Plan (VCDP): Once the commodities were prioritized, detailed VCA were undertaken for deeper understanding of structure and functioning of these value chains. The VCA focused on (i) mapping value chains to obtain a clear understanding of the sequence of activities and the key actors and relationships involved in the value chain; (ii) target markets for the given value chain; (iii) technological capacities across of key actors of the value chains; (iv) analyzing the margins and profits within the chain; (v) identifying the constraints that prevent growth of the value chain; and (vi) policy and regulatory framework of the given chain. Based on the VCA, detailed VCDPs were prepared for the prioritized value chains. The VCDP broadly covers the strategy to be adopted towards the prioritized value chains in terms of short term and medium term actions; and investments needs, skill development, and technical assistance.

21. Collaborations and Partnerships: The project is collaborating with international and national agencies for a transformational change in agriculture through knowledge, innovation, inclusiveness and sustainable growth. These include: International Rice Research Institute, World Fish, International Livestock Research Institute, and World Vegetable Center, National Research Centre (Pig) for supporting the pork value chain. Further, the before project launch, collaborations will be made with other agencies, like NDDB and NDDB Dairy Services (NDS) for supporting the milk value chain; NCDEX e-Markets Limited for possible collaboration for e-spot market for agriculture commodities; Wageningen University and Research Center for postharvest and agro logistics development.

Relevance of APART to SDGs

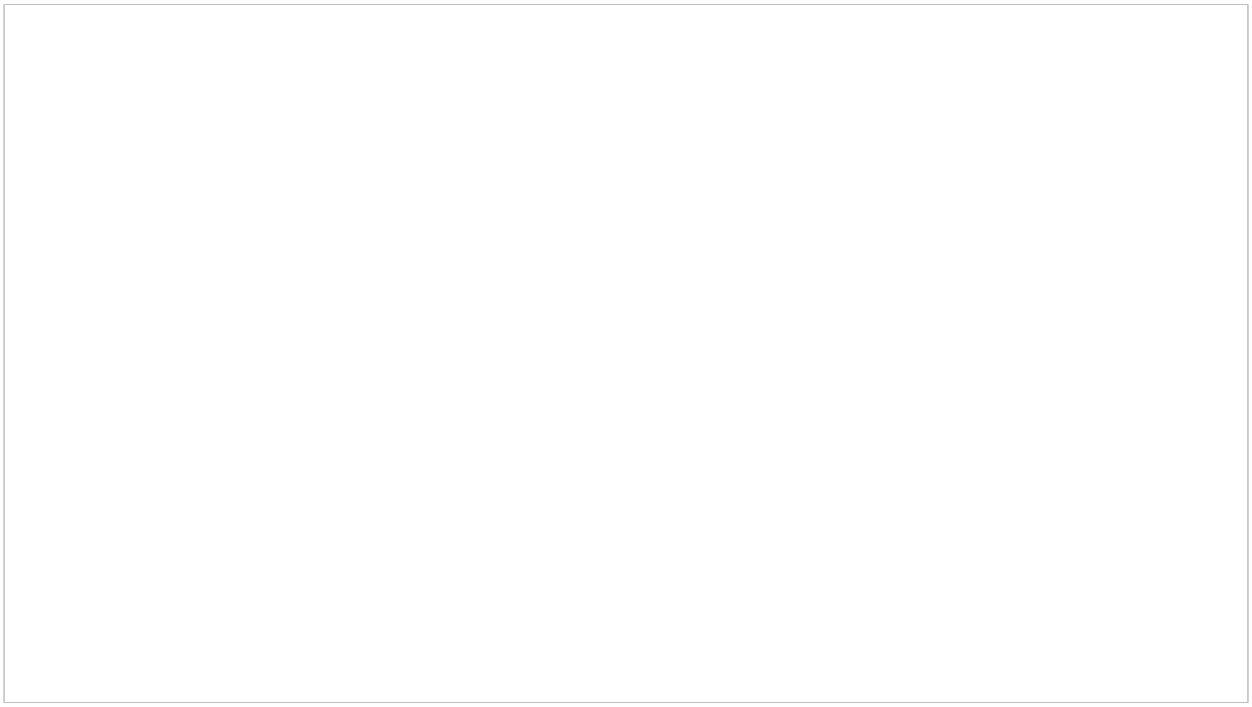
22. The GoA assigns high priority on the Sustainable Development Goals (SDGs) spearheaded by the United Nations. GoA has launched an initiative “Assam 2030 in light of SDG” to implement SDGs as Single Holistic Synergized Initiative (SHSI). The project will support GoA in achieving four out of 17 United Nations’ Sustainable Development Goals, namely:

(a) Goal 2 – End hunger, achieve food security and improved nutrition and promote sustainable agriculture, by enhancing income, food security, and nutrition of large number of rural population, where the majority of Assam’s poor people reside.

(b) Goal 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all by promoting a broad-based agriculture growth and employment in rural areas, where more than two-third of state's population is employed.

(c) Goal 9 – Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation by rehabilitating and modernizing rural roads, common service centers, agro-processing units and farm structures with enhanced resilience features of flood protection.

(d) Goal 13 – Take urgent action to combat climate change and its impacts and reduce GHG effects of agriculture production by promoting a wide range of water saving technologies and agricultural practices expanding areas for high value crops with less water, improved livestock and fish rearing practices, and by enhancing awareness, and human and institutional capacity on climate change mitigation, adaptation, and impact reduction.



Results Framework

Project Development Objective								
The Project Development Objective (PDO) is to "add value and improve resilience of selected agriculture value chains, focusing on smallholder farmers and agro-entrepreneurs in targeted districts of the State of Assam".								
These results are at	Project Level							
Project Development Objective Indicators								
		Cumulative Target Values						
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target = YR 7**
Farmers reached with agricultural assets or Services**(CRI)**	0	50,000	100,000	200,000	300,000	400,000	500,000	500,000
Of which female beneficiaries (number)	0	30,000	30,000	60,000	90,000	120,000	150,000	150,000
Increase in price premium of commodities sold by beneficiaries in the selected value chains (Percentage)	0	0	5	10	15	20	20	25
Share of selected commodities sold through new marketing channels(Percentage)	0	0	5	10	15	20	20	25
Farmers adopting improved agricultural technology (number) **(CRI)**	0	0	30,000	80,000	108,000	240,000	360,000	360,000
Of which female beneficiaries (number)	0	0	21,600	43,200	64,800	86,400	108,000	108,000

Intermediate Results Indicators								
		Cumulative Target Values						
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target**
Component A: Enabling Agri Enterprise Development								
Agribusiness investments leads facilitated through the Assam Bureau of Investment Promotion (ABIP) (number)	0	0	20	60	100	200	250	300
Enterprises supported by EnterpriseDevelopment and Promotion Facility (EDPF) (number)	0	0	0	200	400	800	1000	1500
Investment made and leveraged by the agri business Fund (amount in USD M)	0	0	0	5	10	15	20	30
Component B: Facilitating Agro Cluster Development								
Joint actions undertaken by firms in a cluster (number)	0	0	28	96	164	232	300	300
Agri-industrial cluster plans developed (number)	0	0	7	17	17	17	17	17
Firms mobilized into industry associations (number)	0	0	700	1700	1700	1700	1700	1700
Negotiable warehouse receipts issued to project beneficiaries (number)	15	15	1000	5000	10000	15000	20000	25,000
Increase in trading volume through improved markets (Percentage)	0	5	5	10	15	15	20	20
Rural roads upgraded with climate resilient technologies (KM)	0	0	50	100	100	100	100	100

Intermediate Results Indicators								
		Cumulative Target Values						
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target**
Component C: Fostering Market Led Production and Resilience Enhancement								
Climate resilient technologies demonstrated in the project areas (Number)	0	7	15	25	25	25	25	25
Farmer Producer Organizations(FPOs) supported by the Project								
FPOs (Number)	0	0	60	100	100	100	100	100
Members (Number)	0	0	24000	40000	40000	40000	40000	40000
Volume throughput of the Common Service Centers (CSCs) (tons per annum)								
Pork (MT)	0	0	760	3180	6330	9640	12740	12850
Fish (MT)	0	0	0	2000	3500	5500	6000	10000
Milk (TLPD)	27	30	45	90	175	315	505	790
Agricultural Commodities (MT)	0	0	0	40000	45000	53000	60000	70000
Producers provided with financial education and counseling through the project.	0	2,500	10,000	30,000	70,000	150,000	200,000	250,000
Producers with increased access to financial services(number) of which at least 30% are female (Percentage)	0	0	5000	15,000	35,000	75,000	100,000	125,000
Component D: Project Management, Monitoring and Learning								
Grievances registered related to delivery of project benefits that are actually addressed (Percentage)**(CRI)**	0	70	80	80	100	100	100	100

Output Indicators								
		Cumulative Target Values						
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target**
Component A: Enabling Agri Enterprise Development								
Number of Road shows organized for agribusiness under the project (Number)	0	0	02	03	04	05	05	05
Number of Agribusiness Business Investment Summits organized (Number)	0	0	02	03	04	05	05	05
Number of Exposure Trips for DI&CC officials (Number)	0	24	48	72	96	120	144	144
Number of Agribusiness MOUs signed (Number)	0	0	12	24	36	48	60	70
Number of Beneficiaries provided " Short Term Support" through EDPF (Number)	0	180	350	540	720	900	1080	1250
Number of Beneficiaries of Business Development &Management	0	0	80	130	170	210	260	300

Output Indicators								
		Cumulative Target Values						
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target**
Services through EDPF(Number)								
Number of Incubatees graduating from the long term intensive incubation program supported under EDPF (Number)	0	0	0	3	6	9	12	15
Number of firms invested by the Agribusiness SME Fund (Number)	0	1	3	5	7	9	11	11
Total amount of investment made in the firmsby the Agribusiness SME Fund (Amount in USD M)	0	3	6	15	21	27	30	30
Component B: Facilitating Agro Cluster Development								
Number of Agro-Industrial Cluster Development Plans (AIDPs) Developed (Number)	0	0	7	17	17	17	17	17
Number of firms mobilized into Industry Associations (IAs) (Number)	0	0	1000	2000	2000	2000	2000	2000
Number of Warehouses Upgraded (Number)	0	0	16	33	33	33	33	33
Warehouse Receipt Financing (Amount in INR lakhs)	0	0	0	5	10	15	20	25
Number of Markets Upgraded (Number)	0	0	15	50	70	75	75	75
Number of E-Trading Facility / Spot Exchange Platforms Operational (Number)	0	0	0	1	2	4	4	4
Number of Open Auction Platforms Operational (Number)	0	0	0	9	19	30	30	30
Number of motivational seminars conducted to attract buyers/sellers to the markets (Number)	0	16	48	80	112	144	144	144
Component C: Fostering Market Led Production and Resilience Enhancement								
Horticulture, crop, spices and condiments value chains								
Number of Demonstrations on Climate Resilient Technologies conducted by Agriculture and Horticulture Departments (Number)	0	1814	5054	9164	13274	17034	20234	22000
Number of Demonstrations on Climate Resilient Technologies conducted by Assam Agricultural University (Number)	0	210	450	690	832	832	832	832
Number of Trainings of Nursery Growers Conducted (Number)	0	20	40	60	100	140	140	140
Pork Value Chain								
Number of Demonstrations on Climate Resilient Housing Technology for Breeders and Fatteners(Number)	0	0	18	48	93	138	176	176
Number of Farmers Adopting Climate Resilient Technologies Demonstrated under the Project (Number)	0	0	120	420	1170	2370	3620	3670

Output Indicators								
		Cumulative Target Values						
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target**
Number of Pigs Produced for Breeding (Number)	0	0	2592	12960	33048	62856	100764	138996
Number of PigsProduced for Market as Fatteners (Number)	0	0	18144	90720	231336	439992	705348	972972
Kilograms of Pigs Produced ('000 kg)	0	0	1270	6560	17110	33180	54410	75820
Kilograms of Pork produced (assuming 60% as dressed weight) ('000 kg)	0	0	760	3940	10270	19900	32500	45490
Milk Value Chain: Formal sector								
Number of AI Services to be Administered per Year (Number)	0	56550	156420	303330	482790	679374	894546	1132530
Number of Calves to be Born per Year (Number)	0	15834	43798	84934	135181	190225	250471	317110
Number of Dairy Farmers to be reached through MPIs/DCS (Number)	0	1275	5180	10650	18480	27895	36400	44955
Quantity of Milk to be Procured from MPIs/DCS ('000 kgper Day)	0	25	36	54	82	120	159	202
Creation of Chilling Capacity (BMCs) ('000 liters per Day)	0	4	18	64	141	209	287	307
Creation of Liquid Milk Processing Capacity ('000 liters per Day)	0	0	40	130	130	180	180	180
Milk Sales ('000 kg Per Day)	0	66	80	112	135	158	187	217
Milk Value Chain: Informal sector								
Dairy Informal Milk Marketable Surplus (kg per Day)	0	0	0	21600	51840	82080	103680	207360
Informal Milk channelled into the Formal Sector (kg per day)	0	0	0	10800	25920	41040	51840	103680
Informal Milk available for processing (kg per day)	0	0	0	1080	3888	8208	12960	31104
Value Realized from the Informal Milk Channelled to the Formal Milk Sector (Rs'000 per day)	0	0	0	1171	3032	5135	6887	14533
Fisheries Value Chain								
Area Under Climate Resilient Aquaculture Practices (Hectares)	0	0	250	650	1150	1450	1700	1700
Water Area in Hectares to be covered under Technology Demonstration in Beel fisheries (Hectares)	0	0	125	425	925	1625	2225	2225
Increase in Marketable Surplus due to climate resilient aquaculture practices (Tons)	0	0	1225	3125	5225	6625	7850	7850
Increase in Marketable Surplus due to technology demonstration in Beel fisheries combining small indigenous fishes (Tons)	0	0	250	850	1850	3250	4450	4450
Sericulture and Handloom Value Chain								
Increase in ***Eri*** Raw Silk production (Tons)	299	299	330	360	390	420	451	451
Increase in ***Muga*** Raw Silk production (Tons)	12	13	14	15	16	17	18	18

Output Indicators

		Cumulative Target Values						
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target**
Increase in ***Eri*** fabric production (in metres)	598000	626000	656000	690000	736000	788000	844000	902000
Increase in ***Muga*** fabric production (in metres)	198000	201300	211860	222420	237820	254980	272910	291610
Cross cutting areas of Formal and Informal Milk Sectors								
Number of animals covered under the projects immunization program (Number)	0	207896	617528	1168615	1798502	2444734	3105421	3727758
Number of animal health camps (Number)	0	736	2348	4512	7096	9784	12565	15111
Number of reproductive health and Mastitis management camps (Number)	0	232	412	608	689	736	769	769
Number of Gopal Mitras trained and established (Number)	0	0	17	32	37	42	46	46
Training of DCS members on Dairy management (Number)	0	0	20	83	130	177	210	210
Component D: Project Management, Monitoring and Learning								
Grievances registered related to delivery of project benefits that are actually addressed (Percentage, Key Project Indicator) **(CRI)**	0	70	80	80	100	100	100	100

Outcome Indicators

		Cumulative Target Values						
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target**
Component A: Enabling Agri Enterprise Development								
Percentage increase in investments in Agri business facilitated through the Assam Bureau of Investment Promotion (ABIP) (Percentage)	0	0	0	10	25	50	75	100
Beneficiaries graduating from Incubation process through the Enterprise Development and Promotion Facility (EDPF) and remaining in business after 3 years (Percentage)	0	0	0	45	50	60	75	75
Component B: Facilitating Agro Cluster Development								
Increased traffic density on completed Roads (Percentage)								200
Rural population in project districts served by Roads upgraded with Climate resilient technologies (Percentage)					10			20
Reduction in travel time for vehicles on completed roads (Percentage)								20

Outcome Indicators								
		Cumulative Target Values						
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target**
Increase in trading volume through improved markets (Percentage)	0	5	5	10	15	15	20	20
Farmers satisfied with volume and relevance of market information (Percentage)	0	0	0	10	15	20	30	40
Component C: Fostering Market Led Production and Resilience Enhancement								
Increase in yield of targeted commodities by project beneficiaries								
Of which Fish (Percentage)	0	0	50	80	100	100	100	100
Of which Milk (Percentage)	0	0	0	0	300	300	300	500
Of which Pork (Percentage)	0	0	5	15	20	25	30	40
Of which agricultural commodities (Percentage)	0	0	125	140	145	150	150	150
Percentage of traditional milk vendors in the unorganized sector trained in improved milk handling and distribution transit to the formal milk sector (Percentage)			10	15	25	30	35	40

Project Development Objective Indicators				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
Farmers reached with agricultural assets or services (number) ***CRI***	This *Corporate Results Indicator* measures the number of farmers (defined here as people engaged in farming activities or members of a farming business) provided with agricultural assets or services by the project (disaggregated by gender). The baseline value of this indicator will be zero.	Annual, Mid-term and Final Review	Project MIS and field surveys (incl. baseline and end line surveys)	PIUs aggregated by the PCU
Increase in quality as measured by price premium of commodities sold by beneficiaries in the selected value chains (number)	This indicator measures the value add at the commodity level for selected value chains which contributes to the enhanced income of participating farmers (defined here as people engaged in farming activities or members of a farming business) and is a proxy for competitiveness and effectiveness of commercial agriculture.	Annual, Mid-term and Final Review	Project MIS and field surveys (incl. baseline and end line surveys)	PIUs aggregated by the PCU
Share of selected commodities sold through new marketing channels (%)	This indicator captures the proportion of total production accessing new marketing channels supported by or made accessible because of policy reforms supported by the project	Annual, Mid-term and Final Review	Project MIS and field surveys (incl. baseline and end line surveys)	PIUs aggregated by the PCU
Farmers adopting improved agricultural technology (number)***CRI***	This *Corporate Results Indicator* measures the number of farmers (defined here as people engaged in farming activities or members of a farming business) of the project who have adopted an improved agricultural technology (specifically climate resilient technologies and practices) promoted by the project (disaggregated by gender). The baseline value of this indicator will be zero.	Annual, Mid-term and Final Review	Project MIS and field surveys (incl. baseline and end line surveys)	PIUs aggregated by the PCU

Intermediate Results Indicators				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
Enterprises facilitated through the Assam Bureau of Investment Promotion (ABIP) (number)	This indicator measures the number of rims (defined as both new & existing firms) which has formally expressed to invest in the state through ABIP seervices. The base line value for this indicator will be zero	Annual, Mid-term and Final Review	Project MIS	PIUs aggregated by the PCU
Enterprises supported by the Enterprise Development and Promotion Facility (EDPF) (number)	This indicator measures the number of firms (defined as both new and existing enterprises), which have established or expanded operations due to support of the EDPF. The baseline value of this indicator will be zero.	Annual, Mid-term and Final Review	Field Surveys complemented by information from service providers upon validation	PCU
Private sector investment leveraged by the Agribusiness Fund (amount in USD)	Total investment in Agri-business SMEs supported by the Agri. business Investment Fund, including investment made by the fund, and any follow-on investment, made by other investors directly into the SMEs or by the entrepreneur. The base line value of this indicator value will be zero.	Annual, Mid-term and Final Review	Data reported from investment fund manager upon validation	PCU
Number of joint actions undertaken by firms in a cluster (number)	This indicator captures the number of joint actions (defined here as trade fair participation, joint marketing materials, exposure visits, and technical service delivery workshops) undertaken by firms in a cluster. It is expected that firms will undertake 4 joint actions per cluster per year. The baseline value of this indicator will be zero.	Annual, Mid-term and Final Assessment	Project MIS	PCU
Number of agro-industrial cluster plans developed (number)	This indicator measures the number of agro-industrial cluster plans developed by the industry associations. The baseline value of this indicator will be zero.	Annual, Mid-term review and Final Assessment	Project MIS	PCU
Number of firms mobilized into industry associations (number)	This measures the number of firms (defined as new and existing enterprises) in each cluster mobilized into industry associations over the project period. The baseline value of this indicator will be zero. (Assumption, an average of 100 firms in each cluster mobilized over the project period, with 75% of that in year 1 itself and the remaining being added over the years).	Annual, Mid-term review and Final Assessment	Project MIS	PCU
Number of negotiable warehouse receipts issued to project beneficiaries (number)	Warehouse capacity upgraded is about 73,000 mt in 40 warehouses. It is assumed that the primary commodities stored would be paddy, maize and other field crops. Capacity utilization assumed at 70% (about 51,000 mt). Average lot size for storage is assumed at 2.0 mt per warehouse receipt (combination of farmer, FPO, trader and millers). Hence, number of NWR issued equals 25,000.	Annual, Mid-term review and Final Assessment	Project MIS	PIU aggregated by the PCU
% Increase in trading volume through improved markets (%)	This indicator captures the percentage increase in the volume of all commodities that are traded in both the improved and new markets supported by the project. The baseline value of this indicator will be captured from the baseline survey for the project.	Annual, Mid-term review and Final Assessment	Project MIS and field surveys (incl. baseline and end line surveys)	PIUs aggregated by the PCU
Rural roads upgraded with climate resilient technologies (Km)	This indicator captures the length of rural roads rehabilitated under the project using climate resilient technologies.	Annual, Mid-term review and Final Assessment	Project MIS and field surveys (incl. baseline and end line surveys)	PIUs aggregated by the PCU
Climate resilient technologies demonstrated in the project areas (number)	This indicator measures the number of unique climate resilient technologies demonstrated by the project. The baseline value of this indicator will be zero.	Annual, Mid-term review and Final Assessment	Project MIS	PCU
Farmer Producer Organizations (FPOs) supported by the Project	This indicator measures the number of FPOs created or supported under the project. The baseline value of this indicator will be zero.	Annual, Mid-term review and Final Assessment	Project MIS and field surveys (incl. baseline and end line surveys)	PCU

Intermediate Results Indicators				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
Increased volume throughput of the Common Service Centers (CSCs) (tons per annum)	This indicator measures the quantity of commodities handled at the CSC for post-harvest treatment.	Annual, Mid-term and Final Assessment	Project MIS and field surveys (incl. baseline and end line surveys)	PCU
Producers provided financial education / counseling through the project.	This indicator measures the number of farmers in Common Interest Groups (CIGs) provided with financial education and counseling.	Annual, Mid-term and Final Assessment	Project MIS and field surveys (incl. baseline and end line surveys)	PCU
Producers with increased access to financial services (number) of which at least 30% are female (Percentage)	This indicator measures the number of farmers with increased access to financial services through selected sub-project activities under the project. The baseline value of this indicator will be zero	Annual, Mid-term and Final Assessment	Project MIS and field surveys (incl. baseline and end line surveys)	PCU
Grievances registered related to delivery of project benefits that are actually addressed (Percentage)***CRI***	This *Corporate Results Indicator* measures the transparency and accountability mechanisms established by the project so that the target beneficiaries have trust in the processes and are willing to participate, and feel that their grievances are attended to promptly. Thus the project monitoring system should provide information on the number of complaints received against the number actually resolved.	Annual, Mid-term and Final Assessment	Project MIS and field surveys (incl. baseline and end line surveys)	PCU

Output Indicators				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
Number of Road shows organized for agribusiness under the project (Number)	This Indicator measures the number of Road shows organized to attract agribusiness investment in the State of Assam under ABIP	Annual	Project MIS	PIU (Department of Industries) aggregated by the PCU
Number of Agribusiness Investment Summits organized(Number)	This indicator measures the number of Investment summits organized to bring in agribusiness investors to the State of Assam under ABIP	Annual	Project MIS	PIU aggregated by the PCU
Number of Exposure trip of DI&CC officials (Number)	This indicator measures the number of exposure trips for capacity building of the DI&CC officials on innovative practices in investment promotion from leading investment promotion bureaus in different parts of the country with a view towards replicating them in Assam.	Annual	Project MIS	PIU aggregated by the PCU
Number of Agribusiness MOUs signed(Number)	This indicator measures the number of successful grant agreements through MOUs signed with agribusiness investors	Annual, Mid-term and Final Review	Project MIS	PIU aggregated by the PCU
Number of beneficiaries provided Short Term sSupport through EDPF (Number)	This indicator measures the number of beneficiaries availing of light-touch pre-investment support (defined here as 4 – 5 months)by the Enterprise Development and Promotion Facility (EDPF)	Annual, Mid-term and Final Review	Project MIS	PCU
Number of beneficiaries of business development & management services through EDPF (Number)	This indicator measures the number of beneficiaries availing of post-investment support (defined here as 11–14 months) by the Enterprise Development and Promotion Facility (EDPF) that includes access to finance, business plan preparation and improvement, support in elevator pitch, business advice, cash flow management, regulatory compliances, financial management, general and specific mentoring, technology, training etc.	Annual, Mid-term and Final Review	Project MIS	PCU

Output Indicators				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
Number of Incubatees graduating from long term intensive incubation program supported under EDPF(Number)	This indicator measures the number of beneficiaries availing of intensive pre and post investment support of 18 – 36 months by the Enterprise Development and Promotion Facility (EDPF). [Support to the beneficiaries will include facilitating initial seed capital, mentor network, branding, facilitating technology commercialization and licensing]	Annual, Mid-term review and Final Review	Project MIS	PCU
Number of firms invested by the Agribusiness SME Fund (Number)	The indicator measures the number of firms invested by the Agribusiness SME Fund in Assam.	Annual, Mid-term review and Final Review	Project MIS	PCU
Total amount of Investment made in the Firms by the Agribusiness SME Fund (Million USD)	The indicator measures the amount (in Million USD) of investment made by the Agribusiness SME Fund in Assam.	Annual, Mid-term review and Final Review	Project MIS	PCU
Number of Agro Industrial Cluster Development Plans (AIDPs) Developed(Number)	This indicator measures the number of Agro Industrial Cluster Development Plans (AIDPs) developed by the Cluster Facilitation Team (CFT) and approved by the Cluster Development Technical Agency (CDTA)	Annual, Mid-term and Final Review	Project MIS	PIU / PCU
Number of firms mobilized into Industry Associations (IAs)(Number)	This indicator measures the number of enterprises mobilized into Industries Associations (IAs) at the Cluster Level	Annual, Mid-term and Final Review	Project MIS	PIU / PCU
Number of Warehouses upgraded (Number)	This indicator captures the number of warehouses upgraded under the project	Annual, midterm review and final assessment	Project MIS	PIU aggregated by the PCU
Warehouse receipt financing (value in INR lakhs)	This indicator measures the value of finance secured as collateral against goods deposited in each warehouse supported under the project	Annual, midterm review and final assessment	Project MIS	PIU aggregated by the PCU
Number of markets upgraded(Number)	This indicator captures the number of markets upgraded under the project	Annual, midterm review and final assessment	Project MIS	PIU aggregated by the PCU
Number of E-Trading Facility / Spot Exchange Platforms Operational (Number)	This indicator measures the number of electronic auction and electronic spot exchange facilities to be introduced and operational at selected markets supported under the project	Annual, midterm review and final assessment	Project MIS	PIU aggregated by the PCU
Number of Motivational seminars conducted to attract buyers / sellers to the markets (Number)	This indicator measures the number of motivational programmes organized to attract buyers and sellers to the upgraded markets	Annual, midterm review and final Assessment	Project MIS	PIU / PCU

Output Indicators				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
Number of Demonstrations on Climate Resilient Technologies conducted by Agriculture and Horticulture Departments(Number)	This indicator measures the number of demonstrations to the farmers on climate resilient technologies offered through the project. The demonstrations will be conducted by Agriculture and Horticulture Departments.	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of Demonstrations on Climate Resilient Technologies conducted by Assam Agricultural University(Number)	This indicator measures the number of demonstrations to the farmers on climate resilient technologies offered through the project. The demonstrations will be conducted by Assam Agricultural University	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of trainings of Nursery Growers conducted(Number)	This indicator measures the number of trainings for nursery growers under the project by Assam Agricultural University.	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of Demonstrations on Climate Resilient Housing Technology for Breeders and Fatteners (Number)	This indicator measures the number of demonstrations on climate resilient housing technologies for breeders and fatteners supported under the project	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of Farmers adopting Climate Resilient Housing Technologies demonstrated under the Project(Number)	This indicator measures the number of farmers who have adopted climate resilient housing technology for breeders and fatteners promoted by the project.	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of Pigs Produced for Market as Fatteners (Numbers)	This indicator measures the number of fatteners produced for the market through project support	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Kilograms of Pigs Produced ('000 kg)	This indicator measures the weight of live pigs produced for the market through project support	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Kilograms of Pork Produced (assuming 60% as dressed weight) ('000 kg)	This indicator measures the weight of dressed pork produced for the market through project support	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of AI Services to be Administered per Year (Numbers)	This indicator measures the number of AI services to be administered in the project area by WAMUL	Annual, midterm review and final assessment	Project MIS	PIUs aggregated by the PCU
Number of Calves to be Born per Year (Numbers)	This indicator measures the number of improved calves born out of AI services administered under the project	Annual, midterm review and final assessment	Project MIS	PIU aggregated by the PCU
Number of Dairy Farmers to be reached through MPIs/DCS (Numbers)	Number of dairy farmers covered by milk collectives supported by the project	Annual, midterm review and final assessment	Project MIS	PIU aggregated by the PCU

Output Indicators				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
Quantity of Milk to be Procured from MPIs/DCS (’000 kg per day)	This indicator measures the quantity of milk to be procured by WAMUL from the milk collectives supported by the project	Annual, midterm review and final assessment	Project MIS	PIU aggregated by the PCU
Creation of Chilling Capacity (BMCs) (’000 liters per Day)	This indicator measures the quantity of milk handled by the Bulk Milk Coolers installed under the Project	Annual, midterm review and final assessment	Project MIS	PIU aggregated by the PCU
Creation of liquid milk processing capacity (’000 liters per day)	This indicator measures the quantity of milk processed at the Liquid Milk Processing Plants supported by the Project	Annual, midterm review and final assessment	Project MIS	PIU aggregated by the PCU
Dairy Informal Milk Marketable Surplus (’000 kg per Day)	This indicator measures the amount of Milk available for sale per day in the unorganized Milk Sector	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Informal Milk channelled to the formal Milk channel (’000 kg per Day)	This indicator measures the amount of Milk in the unorganized Milk Sector channelled to the formal channel (e.g., registered DCS, sweet-makers etc) due to project initiatives to reform organizational and operational aspect of service delivery in this sector	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Informal Milk available for processing at WAMUL (’000 kg per Day)	This indicator measures the amount of Milk from the Informal sector potentially available for processing at WAMUL after project intervention	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Area Under Climate Resilient Aquaculture Practices (Hectares)	This indicator measures the Water Area covered by the Project for Climate Resilient Aquaculture Practices	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Water Area in Hectares to be covered under Technology Demonstration in Beel fisheries (Hectares)	This indicator measures the Water Area (in Hectares) covered by the Project for Technology Demonstration in Beel Fisheries	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Increase in Marketable Surplus due to climate resilient aquaculture practices (Tons)	This indicator measures the amount of Marketed Surplus of Fish produced under Climate Resilient Aquaculture Practices supported by the Project	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Increase in Marketable Surplus due to technology demonstration in Beel fisheries (Tons)	This indicator measures the amount of Marketed Surplus from Fish produced in the Beel Fisheries due to Project support	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Increase in ***Eri*** Raw Silk production (Tons)	This indicator measures the increase in production of ***Eri*** Silk due to project intervention at the seed and cocoon production stage	Annual, midterm review and final	Project MIS	PIU / PCU

Output Indicators				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
		Assessment		
Increase in ***Muga*** Raw Silk production (Tons)	This indicator measures the increase in production of ***Muga*** Silk due to increased availability of Disease Free Layings (DFLs) through project intervention	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Increase in ***Eri*** fabric production (in metres)	This indicator measures the increase in fabric production due to enhanced availability of raw ***Eri*** silk yarn due to project intervention	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Increase in ***Muga*** fabric production (in metres)	This indicator measures the increase in fabric production due to enhanced availability of raw ***Muga*** silk yarn due to project intervention	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of Animals covered under the Projects Immunization program (Number)	This indicator measures the number of animals immunized for Foot and Mouth disease (FMD), Hemorrhagic Septicemia (HS), Black Quarter (BQ) and Brucellosis	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of Animal Health Camps (Number)	This indicator measures the number of animal health camps on prevalent diseases	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of Reproductive Health and Mastitis Management Camps (Number)	This indicator measures the number of reproductive health and Mastitis management camps supported by the project	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Number of Gopal Mitras Trained and Established (Number)	This indicator measures the number of Gopal Mitras trained on animal husbandry and veterinary practices	Annual, midterm review and final assessment	Project MIS	PIU / PCU
Training of DCS members on Dairy management (Number)	This indicator measures the number of trainings given to the Dairy Cooperative Society (DCS) members on Dairy management	Annual, midterm review and final assessment	Project MIS	PIU / PCU

Outcome Indicator				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
Percentage increase in investments in Agri business facilitated through the Assam Bureau of Investment Promotion (ABIP)(Percentage)	This indicator measures the percentage increase in amount invested by private investors in Agribusiness in Assam facilitated through the Assam Bureau of Investment Promotion (ABIP)	Annual, midterm review and final assessment	Project MIS	Department of Industries / PCU

Outcome Indicator				
Indicator Name	**Description (indicator definition etc.)**	**Frequency**	**Data Source / Methodology**	**Responsibility for Data Collection**
Beneficiaries graduating from Incubation process through the Enterprise Development and Promotion Facility (EDPF) and remaining in business after 3 years (Percentage)	This indicator measures the percentage of beneficiaries availing of incubation support by the Enterprise Development and Promotion Facility (EDPF) and successfully remaining in business after 3 years of graduation from the EDPF.	Annual, midterm review and final assessment	Project MIS	PCU
Increased traffic density on completed Roads (Percentage)	This indicator measures the increase in Traffic Density in the roads upgraded by the Project	Final assessment	Project MIS	PWRD / PCU
Rural population in Project districts served by Roads upgraded with Climate resilient technologies (Percentage)	This indicator measures the increase in communication in the rural areas served by the roads upgraded under the project	Final assessment	Project MIS	PWRD / PCU
Reduction in travel time for vehicles on completed roads (Percentage)	This indicator measures the reduction in travel time for vehicles due to improved condition of the roads upgraded by the project	Final assessment	Project MIS	PCU
Increase in trading volume through improved markets (Percentage)	This indicator captures the percentage increase in the volume of all commodities that are traded in both the improved and new markets supported by the project.	Annual, midterm review and final assessment		ASAMB / PCU
Farmers satisfied with volume and relevance of market information (Percentage)	This indicator measures the relevance and effectiveness of dissemination of relevant information to the farmers on markets	Midterm review and final assessment	Project MIS	PCU
Increase in yield of targeted commodities by project beneficiaries (Percentage)	This indicator measures the percentage increase in productivity of targeted commodities due to project intervention	Midterm review and final assessment	Project MIS	PCU
Percentage of traditional milk vendors in the unorganized sector trained in improved milk handling and distribution transit to the formal milk sector (Percentage)	This indicator measures the percentage increase of Milk Vendors in the unorganized Milk Sector trained under the project in improved milk handling and distribution, transiting to the Formal Milk sector by adopting improved practices	Midterm review and final assessment	Project MIS	PCU

Project Components

23. Project activities are grouped into four (4) basic components as follows:

Component A: Enabling Agri Enterprise Development

24. The objective of this component is to enable establishment, operations and growth of agri enterprises by creating a congenial investment climate and linking them with the much needed access to finance and technology. This will also entail reduction in business and transaction time and cost. The project aims to achieve the said objectives by: (i) strengthening the newly established Assam Bureau of Investment Promotion (ABIP) to market investment opportunities in the state and provide promotion, facilitation and aftercare, in collaboration with other relevant structures, in order to promote agribusinesses; (ii) setting up of an up Enterprise Development and Promotion Facility (EDPF) to foster and accelerate growth of agro-processing sector, with specific focus on MSMEs; (iii) establishment and management of an Agribusiness Investment Fund (AIF) that would provide risk capital (equity/quasi-equity financing); and (iv) support establishing sector stewardship councils which will anchor the policy reform agenda within select value chains.

Sub-Component A1: Enhancing State Capacity to Attract Private Investments-Assam Bureau of Investment Promotion

25. Industrial Overview of Assam: Assam is making several efforts to promote the Industrial activities by harnessing the un-tapped resources available in the state. Creating an ecosystem for Industrialization to attract investment is the prime objective of the Government. The Government has initiated several policy measures as well as infrastructure development activities to boost the industrial growth in the state. The declaration of North east Industrial Investment promotion policy, 2007 (now suspended) supplemented by the State Industrial Policy, 2008 and subsequent Industrial policy in 2014 have been critical triggers for Industrialization in the state. Growth of industrial and service sector in Assam vis-a-vis other states is presented in *annex A-1(a).*

26. In addition, Department of Industries and Commerce has created good number of Industrial Infrastructure facilities as well as up grading the existing ones in different districts in the state. Infrastructure facilities in the form of Export promotion Industrial Park, , Growth centres, Food Processing Parks, Industrial Estates, Industrial Areas and Commercial Estates etc are made available throughout the state. At present, there are 22 Industrial Estates, 5 mini Industrial Estates, 20 Industrial Areas and 12 growth centres. One export promotion Industrial park (EPIP) has also been established with world class Infrastructure at Amingaon in Kamrup district. In addition, 11 nos. of Industrial Infrastructure development (IID) centres in 11 different districts and 3 nos. of Industrial growth centres and one Food park at Chaygaon, Guwahati have already been established.

27. Numbers of agro-processing factories in Assam and important parameters (2012-13).

NIC CODE-2008*	103	104	105	106	107	108	110	131	139
Nos Of factories.	21	60	14	306	794	7	53	16	12
No. Of factories in operation	19	52	13	249	717	7	33	16	11
Fixed Capital	3510	3823	3664	25780	273636	2667	40215	1769	1753
Investment Capital	4607	7512	4528	43317	350928	4707	52150	3910	3313
Gross value of plant & machinery	1244	71	1214	18423	232827	1351	5808	4435	2078
Addition in stock of materials, fuels etc	131	1046	123	-1844	6074	732	613	263	12
Addition in stock of semi finished goods	1	0	0	-672	-5	0	11	-102	452
Addition in stock of finished goods	171	10	18	822	5928	-516	-2744	45	2
Profits	-197	-162	411	9799	95422	-3787	-6262	-928	218

*NIC Code explanations: 103= Processing and preservation of fruits and vegetables; 104=Manufacture of vegetable and animal oils and fats; 105=Manufacture of dairy products; 106=Manufacture of grain mill products, starched and starch products; 107=Manufacturing of other food products; 108=Manufacturing of prepared animal feeds; 110=Manufacturing of beverages; 131=Spinning, weaving and finishing of textiles; 139=Manufacturing of other textiles Source: Annual Survey of Industries 2012-13. There are 43675nos of MSME units in Assam generating employment around 2.5 lakh people till the end of March' 2016. (Nucleus Cell, Office of the Commissioner of Industries and Commerce, Assam.)

28. ***Overview of Agribusiness/ Food Processing Industry in Assam:*** Despite comparative advantage in several agriculture and allied sectors, Assam's industrial growth is yet to harness its untapped natural resources especially despite recent improvements in its primary production. The food processing sector has not grown to the desired level and still in a nascent stage. The sector operates on small scale production with low level investment. The shift of demand from traditional food consumption to processed/convenient food provides the basis for establishment of food processing industry. The emergence of such an industry would sustain& improve the food value of the agricultural produce via processing, marketing, value addition and post-harvest management. Today, the sector faces serious challenges around post harvest wastage and lack of market access that is associated with fragmented supply chain and poor value addition of the local produce.

29. The food value chain is nascent and weak with several characteristics such as low usage of modern input technology, lack of knowledge, outsourcing and labour intensive leading to absence of agro-based industries. These factors thereby necessitate the requirement for a developed food processing industry in Assam. Currently, the food processing industry in Assam unlike other states in India is much unorganized and is operated on a small scale with a small number in size. In most cases, majority of the food crops like paddy, maize, fruits, vegetables and other food crops are consumed and marketed locally as the production is also surplus. The farmers though able to sell their produce locally, fetch prices which are not at par with the markets of other States. Most of the marketed surplus is either sold at low price with less consumption demand of raw food commodities either backed by higher supply or goes unutilized. Most of the produce gets spoiled due to the absence of processing facilities, better market accessibility, and fragmented supply chain and so on. Another aspect of the grim scenario of the food processing industry in Assam is the low investment in assets and limited usage of technology driven production methods in the industry. The role of incorporation of private investment is therefore a prime requisite catering to a vibrant sector of the economy. At present, amid the scope and potentiality of the State's agrarian economy, the pace of investment in the sector is low. Therefore, private investment shall play a key role in the food processing sector.

30. Also, Assam has a huge potential for developing value added food products both for domestic and foreign markets that can not only help the State to earn not only huge foreign exchange but also create massive employment opportunities for the emerging youths. Some of the advantages Assam beholds are: its geographical location which is advantageous for foreign trade with neighbouring countries like Bhutan, Bangladesh, Nepal, Thailand, China etc., well placed to serve the needs of other NE states, special tax incentives for special export oriented units and poised with diverse agro-climatic zones. To realize the true potential of its emerging potential sector which is more or less being neglected must be channelized with adequate investment penetration especially on the rising food processing sector and thereby improve the investment friendly climate in the State.

31. **As-is-Analysis of Investment facilitation in Assam:** Given the priorities of GoA to induce more private investment in the selected sectors of Assam, the Government of Assam has set up a bureau called as the Assam Bureau of Investment Promotion (ABIP) under the recent Ease of doing Business Act 2016 that was enacted in June, 2016. The ABIP is to function as an Investment Promotion Agency (IPA) in the state with the aim to promote private investments in the manufacturing and service sectors in Assam. In the project, APART aims to support the investment promotion agency to catalyze private sector investment in the state's industrial sector. It aims to support the agency to make Assam an attractive

investment destination and harness the overall supervision and administration of the activities related to investment promotion in Assam.

32. Application process for setting up an industry (depending on size of industry):

Size of Industry	Process of registration(divided into two parts: Part A & Part B)	Process of approval
MSME industry with investment in plant & machinery upto INR 5 cr.	**Part A of e-filing system:** • Online filling & submission of EM*-1 form available at e-udyog, GoA website www.diccassam.com • Pre-registration under NEIIPP2007(suspended w.e.f 01-02-2014) • For new unit • For existing unit (undergoing expansion) • Online filling & submission of EM*-2 form available at e-udyog, GoA website www.diccassam.com • Application for Eligibility Certificate under Assam Industrial Policy, 2008 • For new unit • For existing unit (undergoing expansion) • Claim	**EM-1: Auto generated Acknowledgement** All other applications: -Hand copies to be submitted within 3 days of e filling. -Approval issued manually after verification of documents of the enterprises.
	Part B of e-filing system: • Claim for Transport Subsidy Scheme	

33. While the agency is expected to facilitate single window clearance at state level, the investments are often anchored by District Industries & Commerce Centers (DICCs) in the state. The DICCs play a critical role in promotion and facilitation (under the new EODB Act 2016) of private investments in the state. However, it is observed that the DICCs have enormous scope for improvement with respect to their mandate, staffing, functions and day to day operations.

34. While the organogram of DICCs are different for different districts in the state, a recent study by IIE depicts that several positions are vacant and nearly 80% of the senior staff at DICCs are close to retirement in the near future, thereby indicating a need for revamp of the DICCs. For example, out of 17 GMs, 7 GMs are on the verge of superannuation within 3 years while 8 GMs will retire within 3-6 years. There was no training activity of GMs in the field of Agri-business during last 5 years.

35. Several other key observations regarding the status of DICCs emerging from the IIE report [(Executive Summary at *Annex: A-1(b)]* are highlighted below:

- The post of Extension Officer is vital for the growth of Enterprises; however, only 60% posts of Extension officers are filled up.
- None of the officers in the DI&CCs have qualification from Agriculture stream.
- The function of Functional Manager (FM) / Project Manager (PM) with specific responsibility as indicated in the organogram is not applicable in any of the DI&CC office. 47% and 57% of posts in these categories are lying vacant respectively. Regarding qualification, FM/PM are mix of Post graduate/ Technical graduate and graduate from Arts/ science/ commerce stream. They are no significant training programme for this cadre.
- The present ADCI officials are Post graduates in Technical and Arts/ science/ commerce stream. No significant training is recorded.

- Most of the Assistant Manager (AMs) are promoted from Extension Officer (EO) and are from Arts/ Science/ Commerce stream. Almost all are on the way of retirement. No significant training attended.

The above status highlights some of the reasons for the poor growth of enterprises in Assam compared to other States. In this context Govt. of Assam has taken recent initiatives for filling up the vacant posts of AMs and EOs which is underway.

36. Objectives of the sub component: The objective of this sub-component is to strengthen the newly established Assam Bureau of Investment Promotion (ABIP) to anchor the private sector investment promotion and facilitation at the state level and strengthen the District Industries and Commerce Centres (DICC). Activities to be covered under the sub-component include, among others: sector scan for prioritization of competitive sectors, developing and communicating the investment opportunities in the state of Assam, resource mapping studies, and developing a platform to provide investor aftercare services. The ABIP will have the key responsibilities, amongst others, of (i) identifying agribusiness opportunities (ii) preparing project level pitches and disseminating to target investors (iii) conducting other market outreach activities like business to business meets, road-shows, etc., (iv) providing investor aftercare services. ABIP would proactively target, facilitate, and nurture new investments, including agribusiness sector, by leveraging the Ease of Doing Business (EODB) Act.

(a) **Support the Investment Promotion Agency (IPA):** Looking at the challenges to investments in Assam (covered in introductory section above), it is evident that the objective of ABIP is to create an investment friendly and robust business climate in the state enabling industrial activities in the state. It aims to drive the possible investment opportunities in the state's industrial sector. As mentioned earlier, APART aims to support the Assam Bureau of Investment Promotion (ABIP)- the Investment Promotion Agency (IPA) of the state under Ease of Doing Business (EODB) Act in strengthening its institutional framework and promoting sector specific promotion efforts in agribusiness. The ABIP will promote a set of potential sectors where Agribusiness will be one of the sectors. The focus sectors of IPA will be identified through a sector scan and sub sector scan study carried out by a third party agency. The study is likely to start before the project implementation.

(b) **Strengthening of DICCs:** As discussed above, the DICCs form the backbone of investment promotion and facilitation in the state of Assam. The project would support strengthening of DICCs with respect to their key areas in promotion of Micro and small enterprises (MSMEs) in the selected sector and districts. DICCs are also expected to play the role of coordination for agri-enterprise cluster development wherever required. Hence the role is multifunctional in nature. Given the renewed mandate of DICCs, they will be strengthened by (i) Up gradation of physical Infrastructure of the selected 16 DI&CCs and (ii) Training and capacity building of DICC staff of the 16 project districts.

37. Policy and Regulatory Environment: The project would adhere within the framework of the State's Sustainable Development Goals, Vision 2020 and also would promote its activities as per the following policies-

(a) **Assam State Industrial Policy (2014):** Amongst numerous options, the thrust areas identified for investment are Food processing and Agro based Industries, Mineral based industries, Bamboo based industries, Extraction and Value Addition of Herbal Medicinal and Aromatic Plants, Bio-Technology sector, Information Technology related activities, Hospitality industry and Tourism, etc.

(b) **MSME Act 2006:** The Micro, Small and Medium Enterprises Development (MSMED) Act was notified in 2006 for facilitating the promotion and development and enhancing the competitiveness of Micro, small and Medium Enterprises.

(c) **Ease of Doing Business (EODB) Act 2016:** This act is formulated to provide speedy processing of applications and issue of various clearances required to be issued by various competent authority or authorities of the State government of Assam under various state enactments for setting up industrial or service sector undertakings for the promotion of economic development of the state and for an investment friendly environment in the state of Assam and for matters connected therewith or incidental thereto.

38. Eligibility and Selection Criteria: Interested investors fulfilling the policy and regulatory conditions of GoA will be encouraged to make investments in the state through the efforts of ABIP. The targeted investor shall not bear any denigrate record of conduct in his past business activities prior to his work. The sector, size, growth, revenues, years in business, past trends, due diligence shall be based on the company's intent. It is expected that these investments will generate employment opportunities for local unemployed/ educated youth.

39. Proposed Activities for ABIP: It may be noted that while majority of the activities being proposed to support the investment promotion agency are specific to agribusiness investment promotion, some activities such as institutional strengthening at state and district level might have economy wide implications. The investment cycle activities supported for agribusinesses under APART will comprise of activities in the below mentioned areas such as Pre investment, Investment, Post investment.

(a) **(A) Pre Investment Stage:**

(i) **Sector Scan:** In case of Pre-investment support, sector scan would be conducted to identify sectors, sub sectors which are promising in the state. Thereafter, Identification of products based on local markets in the district and also neighbouring districts will be undertaken. Several data sets pertaining to the following aspects will be consolidated before sector/sub sector prioritization-

- Production, marketable surpluses from several commodities,
- Infrastructure available such as warehousing, cold storage, markets, etc their proximity to the proposed industrial clusters
- Existing industries, its owner, Annual production capacity, Annual requirement of raw materials and number of persons employed, Annual requirement of power and manufacturing practice adopted etc.
- Targeted markets / destinations for the finished value added products
- List of technology and machinery providers, quality certification systems required, etc

  Land, dedicated food parks, Infrastructure and support facilities, etc.

(ii) **Analysis of Sector Scan Study**: Upon completion of analyses, the identified sectors (agribusiness being primary focus of the project) and sub sectors under agribusiness will be further analyzed to make an offering. This may involve preparing a comprehensive offering from the state to prospective investors by streamlining various incentives and procedures to set up agribusinesses. This will also involve preparing the unique selling proposition for each of the sub sectors and investment opportunities within these. Marketing collaterals will be prepared to communicate the same with prospective investors

(iii) **Investor Outreach:** Several outreach events will be held in order to attract agribusiness investors from within and outside India to consider Assam as an attractive investment destination. These would involve investment summits, road shows in important target markets such as Delhi, Mumbai and Kolkata.

(iv) **Capacity Building of ABIP Staff:** Given that the state will be focusing on proactive outreach which requires unique skill sets, project would focus on training aspects for key staff of ABIP.

(b) **Investment Stage:** The target group for this activity comprises of new/ prospective investors as well as established investors who are expanding or diversifying their base. The activities during investment stage are oriented according to the target group. These are – (i) Land and site finalization; (ii) Certification and (iii) Clearing various licenses. Based on the said activities, phasing has been planned as below-

- ABIP will liaise with ASIIDC, DICCs in order to facilitate identification and purchase of land for investors, preparation of project reports wherever required, liaising with EODB Cell to facilitate licenses if required, etc
- Several facilitating functions such as partnerships with skill institutions, market linkages for large buyers, etc may be provided by ABIP on a case to case basis
- The investors may be tracked through online portal to understand the pace of approvals and investment turn-around times

(c) **After Care**: It is often observed that firms often need hand holding beyond the investments stage. In case of absence of critical services, several firms are at the risk of becoming non functional or less profitable. Hence after care services in the initial years of establishment become critical. Some of the after care services are-

- Information on the renewal of licenses (annual ,etc)
- General information on good manufacturing practices
- Support services (on chargeable basis) for tax compliance, marketing, technology up-gradation, working capital requirements, accessing PE / other funds etc during modernization or expansion
- General information on new opportunities in agribusiness/ food processing industry

40. Activities to be covered under the project:

(a) **Strengthening of DICCS*:*** This will involve strengthening the DICCs in terms of – (i) Physical infrastructure (DICC office/ administrative set up): Construction of amicable workspaces for DICC staff to conduct business and (ii) Staffing and capacity building of existing staff at DICC: Provide additional resources with relevant skill sets wherever required. Also, provide regular training and capacity building for the staff through exposure visits, training, etc

(b) **Sector Scan Study**: An extensive sector scan study will be carried out by an external agency to freeze on the potential sectors of state economy to be focused by ABIP. After this sector scan study competitive subsectors will be identified for ABIP's interventions. This will impart ABIP the capability to rationalize which sectors need investments and which sectors are attractive to investments and why certain sectors should be promoted.

(c) **Subsector scan study**: After the focus sectors for ABIP are identified, for Agribusiness sector, a subsector evaluation study will be taken up. Within each focus sector, only a few sub sectors will be prioritized. The rationale for picking up a subsector will include global, national and regional markets. Competitive factors to be taken into account are natural resources scenario, land availability, infrastructure and support facilities, skill-set available, overall business environment etc. The department in consultation with ARIAS Society has already taken initiative to hire agency for sector and subsector scan study.

Probable sub-sectors of Agribusiness which may be found attractive for investing within the broad sectors are summarized below-

Sectors					
Agricultural Inputs	**Agricultural Outputs, Procurement**	**Agro Logistics & Supply Chain**	**Agri Financing & Allied**	**Food Processing**	**Agri Consulting**
Subsectors					
Agrochemicals: Fertilizers, Pesticides, Plant Nutrient Supplements,	Cereals & Pulses	Transport	Bank Credit	Food Technologies	Information & Intelligence
Organic Inputs: Bio-fertilizers, Bio-pesticides, Neem Based & other such Products, Organic supplements etc	Fruits & Vegetables	Warehousing	Insurance	Nutrition & Dietetics	Project Preparation & Management
Seeds & Planting material	Spices and Condiments	Cold Storage & Reefer	Warehouse Receipt Financing	Nutraceuticals, Health and Specialty Foods	Turnkey Projects
Tools, Equipments & Machinery,	Milk	Air Cargo Services	Risk Capital, Seed Capital, VC Financing etc	RTE/RTC	
Animal, Poultry & Fish Feed, Animal Health Care	Pork			Food Hygiene & Safety	
	Fish				
	Silk				

(d) **Defining target markets for prioritization:** With sectors identified, this will involve a similar demand side exercise focusing on investment trends of key 'source' locations, be it from within Assam or elsewhere.

(e) **Office set up and Manpower hiring**: The Office of ABIP will set up as per basic requirements and a technical agency will be hired to support the ABIP for the first four years. This technical agency will bring its sector specialists and other expertise to support the investment promotion activities of ABIP. It is expected that during these four years, ABIP management will strengthen themselves with necessary experience for running the ABIP on their own.

(f) **Investor outreach:** Investor outreach will be achieved through a host of programs. Some of these are discussed below

(i) **Investment Summits**: will be an **annual** flagship event organized by the Department of Industries and Commerce under the banner of ABIP. It will be a single day event along with exhibition on the sidelines. It will be a multi-sectoral event with different pavilions for different sectors. Each summit will target wider set of potential investors interested in Assam. It is expected that the outcome of this will lead to identifying potential leads. The Investment summit will be organized from second year onward and continue upto fifth year. The frequency of the summits is minimum of one in a year.

(ii) **Road shows:** Road show will be a focused one day event which will theme around certain specific sectors and will endeavour to attract investors from certain countries/states. Minimum two roadshows will be organized in the 2nd year and thereafter one each year till fifth year.

(iii) **Investor Targeting (including overseas investors)**: This will be accomplished by creating a list of potential investors by identifying the interest of the investors and making efforts to convert the interest into decision to invest. Further one needs to understand the context of the targeting campaign, effectively implementing the investor targeting program.. Physical up gradation of DICC and Manpower hiring on contractual basis will be done as a part of DI&CC strengthening. In each project DICC, one agribusiness specialist and one computer assistant will be recruited from the market.

(iv) **Capacity Building:** Exposure visits will be arranged for DICC staff to leading states' DICCs, leading investment promotion bureaus like iNDEXTb of Gujarat, Punjab Bureau of Investment Promotion (PBIP) and TS-iPASS of Telangana. Efforts will be made to learn the best and innovative practices in investment promotion from elsewhere and effectively replicating them in Assam. Nine officers from each DICC/ABIP split into three batches, totalling to 144 will be trained over a period of six years.

(g) **Estimated Cost:** The estimated tentative cost of the investment promotion program over the project period will be around Rs. 42 crore as shown below. The details are provided in the cost table.

Item of Expenditure	Y-1	Y-2	Y-3	Y-4	Y-5	Y-6	Y-7	Total
Studies, Consultancies & TA	165	629	439	439	400	-	-	2,072
DI&CC Costs	421	517	373	373	216	24	-	1,923
PIU cost	57	57	57	57	-	-	-	228
Total	643	1203	869	869	616	24	0	4223

41. Institutional and Implementation Arrangement:

(a) There will be a Core Project Implementation Unit (C-PIU) of Department of Industries and Commerce at Secretariat level. The CPIU will be headed by Principal Secretary (Industries and Commerce) and Joint Secretary will be the Coordinating Officer. The CPIU will be supported by an Investment promotion Specialist and a Computer Operator both hired from market on contractual basis. The Investment promotion specialist will support the CPIU in the field of Investment promotion. He/ she will formulate road map on trade and competitiveness/ Investment promotion, guide in conducting road show/ Investment summit etc. The MIS will be responsible for all the computer related activities. CPIU will be responsible for–

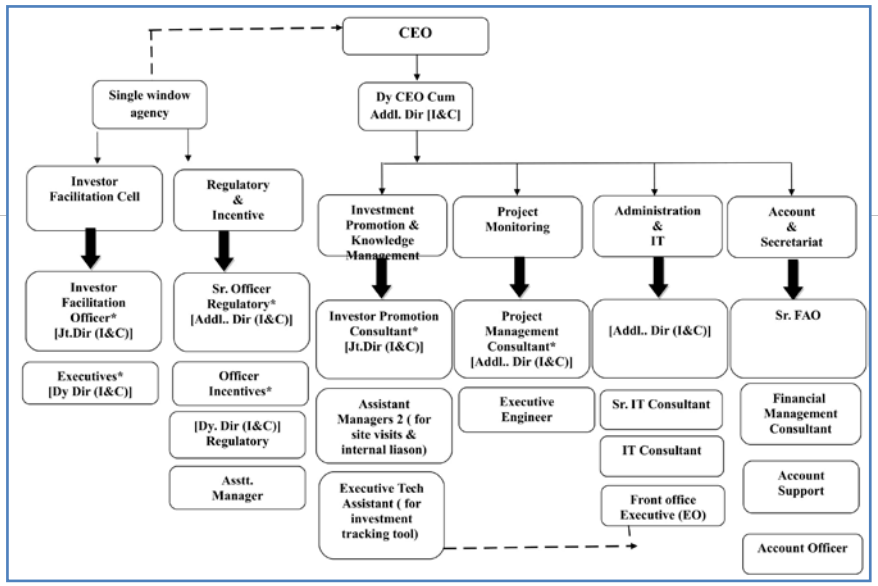
- coordination and linkages at/from secretariat level with the operational PIU and the Project Coordination Unit (PCU);
- extending close cooperation to the PCU of ARIAS Society;
- endorsing the Annual Work Plan (AWP) prepared by OPIU.
- facilitating convergence of other schemes with APART wherever possible;
- reviewing the project implementation (including Physical & financial) in regular interval.
- The CPIU, if required, may hold the review meetings through video conferencing facilities of the NIC at the Secretariat and District level;
- taking corrective measures for removal of impediments and for expediting progress
- monitoring the District Level Coordination Committee (DLCC)/DCs for removal of any hindrance during execution of the project
- validate the physical progress reports and send the same to PCU for triangulation.
- The incremental operational expenses of the CPIU including remuneration of the contractual staff will be borne by the APART

(b) At the Commissionerate level, there will be an Operational PIU (O-PIU). It will be headed by the Commissioner, Industries and Commerce. There will be one nodal officer from the Commissionerate (Govt.). The O-PIU will be supported by a Technical Specialist, Cluster Development Specialist, Accountant, and a Computer Operator. Support staff will be hired on contract from outside. OPIU will be mainly responsible for:

- implementation of the concerned project component
- overseeing the implementation of the department specific activities
- for preparation of the Annual Work Plan, *consistent* with the Project Development Objectives and Project Implementation Plan (PIP)
- monitoring field level activities and identifying corrective actions
- documenting success stories
- providing monthly reports to the PCU

- collecting data to update the input/output indicators and consolidating and analyzing all M&E data provided by District officers
- responsible for preparing, implementing and monitoring their respective annual action plans
- Will monitor the implementation of the individual activities of the sub-component within the purview of the respective departments
- recommending personnel from Directorate of Industries and Commerce for training and capacity building programs under APART

42. ***Proposed Structure of the ABIP:*** Tentative organgram of ABIP is shown below



43. **Scope of ABIP:** ABIP will be the first reference point for investors and will act as a primary support for all queries, handholding and liaison services required. It will promote investments in Assam in a focused, comprehensive and structured manner, streamlining investment facilitation services into the sectors. APART will provide technical support to ABIP with impetus on wide range of sectors including agri-enterprises irrespective of volume. ABIP will coordinate with Department of Industry, other state agencies and other stake holders– Infrastructure dev corporations export promotion agencies. Ultimately, ABIP will aim to build up a cohesive institutional platform to facilitate investor's right from pre-investment to investor after care services.

44. ***Technological offerings of ABIP-Chart:*** The ABIP will have the technological facilities offered to investors that would suit the economic and industrial development requirements including the raw materials and resources. The illustrative list of datasets on offer is shown at annex-A-1 (c).

45. **Services OF ABIP:**

(a) **Pre - Investment Services provided by ABIP:**

(i) **Land Information**: Information on land parcels available for industrialization will be made available through web portal of ABIP with other specifications like location, connectivity, surroundings, resource availability, power, water, location safety etc.

(ii) **Information on legal and regulatory aspects**: The information on certifications, approvals, licenses required for setting up different kinds of industries, time required to get these and fees, other terms and conditions etc will be provided in an easy to access manner through the web portal of ABIP.

(b) **Investment services provided by ABIP:** The ABIP will facilitate investors towards the issues related to land, trade, logistics and environmental policy. ABIP will act as 'deal breaker' as a measure for creating conducive investment climate in the state. Contract farming may be facilitated for needy agribusinesses with the support of Department of Agriculture. The Bureau will coordinate closely with the investors in achieving the desired objectives with a shared commitment from Government and other stakeholders.

(c) ABIP will facilitate clearance of various licenses needed for investment. Apart from this, it will facilitate existing policy support for easy setting up. It will advocate relevant policy reforms to the State Government for improving the investment climate in the state.

(d) **Aftercare (Post Investment) Services provided by ABIP**: ABIP will provide for advisory services to expand business operations in the state. Further it will address the business obstacles faced by the industry in the state. Apart from this, provision of feedback from investors to State Government to improve the industrial & investment climate will also be facilitated by the ABIP.

46. Result Chain and Result Framework:

(a) **Results Chain**

Activities	Sub Activities	Output	Outcome
Setting up of ABIP as IPA for APART	Physical Infrastructure Development of ABIP	An investment friendly and robust business climate.	Increased investments in agribusiness in Assam
		A cohesive Institutional platform to facilitate investors from pre investment stage to after care services.	
		Improved climate for transparency and time bound clearances to help the investors with a hassle free business environment.	
		Increased investments through streamlining and simplifying procedures.	
		Showcasing the state as a best investment destination highlighting resources of Assam, Incentive policies, industrial Infrastructure, land availability and ease of doing business.	
	Manpower support at ABIP	Increased capacity of ABIP for better service delivery	
	Organize road shows	Agribusiness investments facilitated through the ABIP	Increased in number of jobs and increased number of enterprises established because of increased private investments
	Investment summits		
Strengthening of DI&CC	Physical up gradation of DI&CC in selected districts	Better working environment for DI&CC staff	
	Exposure trips of DI&CC officials	Increased capacity of DI&CC officials	

(b) **Results Framework**

Assam Bureau of Investment Promotion (ABIP)								
Years→	**Base**	**Y-1**	**Y-2**	**Y-3**	**Y-4**	**Y-5**	**Y-6**	**Y-7 (Cumulative)**
Number of Road shows organized	0	-	02	03	04	05	05	05
Number of agribusiness Investment summits organized	0	-	02	03	04	05	05	05
No. of officials going on exposure trips (DICC and ABIP)	0	24	48	72	96	120	144	144
Agribusiness investments leads facilitated through the Assam Bureau of Investment Promotion (ABIP) (No.)	-		20	60	100	200	250	300
No. of Agribusiness MoUs signed	0	0	12	24	36	48	60	70

Note: It is estimated that 150 investors will be facilitated through Roadshows (including foreign investor targetting) as a starting point and another 150 will be facilitated through Investment Summits. Further it is estimated that each road show will convert at least 35 investors to final decision for investments. Similarly, each investment summit is expected to convert 35 investors for final investments in the state. Hence total number of MoUs to be signed will be around 70.

47. Sustainability: Funding beyond project four years would be ensured through alternative means. Institutional support like mentoring as after care service would be provided by DI&CCs. Constant handholding support from concerned DI&CC will be provided.

48. Risks and mitigation measures

Risks perceived	**Mitigation measures**
Power shortage	Establish mechanism in ABIP to coordinate with power Deptt
Socio political instability	Strong governance and administration to be in place.
Global and national level macro economic factors (for instance; changes in tariff measures, foreign currency exchange rates, unanticipated inflation, unanticipated market competition etc.)	Malleable ABIP strategy
Enhanced federal competitiveness (i.e. better ABIP capacities in nearby States) risk	Awareness by monitoring main competitors' activities and performance.
Lack of local market access for some of the manufactured products	Road (expressway) from Assam to South East Asian countries (Asian Higahway-1)

Sub-Component A2: Setting up Enterprise Development and Promotion Facility (EDPF)

49. Setting up Enterprise Development and Promotion Facility (EDPF): This subcomponent aims to promote an enabling agriculture enterprise ecosystem in the state. Towards this, the project will establish an Enterprise Development and Promotion Facility (EDPF) to foster and accelerate growth of agro-processing sector, thereby promoting commercialization of agricultural production, increasing value addition and agricultural incomes. The EDPF will identify growth oriented entrepreneurs, who are pursuing business opportunities related to postharvest value addition in agriculture and allied sectors, and provide these entrepreneurs with a holistic service offering that accelerates their growth and promotes sustainability. It is expected that EDPF will have a catalytic effect, encouraging a new generation of entrepreneurs to enter, grow, and advance the industry

50. These days there is renewed focus on agribusiness and a shift from primary production to value addition. Small Business Association (SBA) states that 30% of new businesses fail during the first two years, 50% during the first five years and 66% during the first 10 years[6]. With incubation support the success rate of businesses is observed at 75-81% as per Jill Sawyers of the Innovation Hub in South Africa[7]. National Business Incubator Association (NBIA) states that incubated businesses have an 87% survival rate, and 84% go on to do business in their local regions[8].

51. Policy & Regulatory Environment:

(a) As of now there is no policy on agribusiness incubation in India. As a result, there is a big void in agribusiness incubation in India. There are only a few incubators dedicated solely to agribusiness. An increasingly younger population is entering the workforce, which puts a pressure on the Govt. in the absence of enterprises, as Govt. cannot provide jobs to all, neither can the existing private sector absorb the entire workforce. Such a scenario demands for a network of dedicated agri business incubators, which will lead to creation of more agri enterprises and more jobs. Use of modern technologies in agribusinesses is low, partly due to lack of affordability and partly due to the absence of a fair technology transfer policy regulation. However, recent announcement of the national IPR policy in May 2016 by the Govt. is a positive step in this direction.

(b) **National Research Development Corporation (NRDC)** supports licensing of technologies from licensor to licensee through assignment on commission basis. Their portfolio covers agricultural technologies also. Technology Development Board (TDB) identifies, develops and helps license the technologies. For North East region their focus is Agriculture sector. There are only a few private organizations facilitating technology transfers between researchers/technologists or institutes and agribusinesses. Ex. Skyquest Technologies, Steinbeis etc.

(c) **Venture Capital Financing**: The present pool of funds available for venture capital is very limited and is predominantly contributed by foreign funds (to the extent of 80 percent). The pool of domestic venture capital needs to be augmented by increasing the list of sophisticated institutional investors permitted to invest in venture capital funds[9].

(d) ***Assam Venture Capital Scheme****:* The credit support would be from Rs. 10 lakh to 100 lakhs. Upto 80% of the cost may be covered depending upon the merit of the proposal. The amount will be sanctioned as a term loan with an interest rate of 10% and repayment period of 5-7 days. Upto 50

[6] Source: http://www.investopedia.com/slide-show/top-6-reasons-new-businesses-fail/
[7] Source: https://www.infodev.org/infodev-files/resource/InfodevDocuments_774.pdf
[8] Source: http://www.forbes.com/2006/10/19/nbia-incubator-peapod-ent-tech-cx_mc_1019incubator.html
[9] Source: *Report of K.B. Chandrasekhar Committee on Venture Capital, SEBI, 2000*

lakhs loan will be sanctioned at Head office while above 50 lakhs will require approval of Board of Directors.

(e) ***Assam Angel Fund for Start Ups****:* Ceiling 5 lakhs, interest rate 5%. 80 per cent of the project cost for existing units and 85 per cent for new units without mortgage is covered under this fund. Initial fund value= Rs. 12 Crore. Assam Gramin Vikas Bank (AGVB) is the financial institution for this fund.

(f) ***Start Up India****:* Key features of the scheme include Single Window Clearance even with the help of a mobile application, 10,000 crore fund of funds, 80% reduction in patent registration fee, modified and more friendly bankruptcy code to ensure 90-day exit window, freedom from mystifying inspections for 3 years, freedom from capital gain tax for 3 years, freedom from tax on profits for 3 years, eliminating red tape, self-certification and compliance etc.

(g) ***Stand up India****:* Initiative is aimed at promoting entrepreneurship among Scheduled casts/ Scheduled tribes (SCs/STs), women communities. The scheme facilitates bank loans between Rs. 10 lakh and One crore to at least one schedule caste or scheduled tribe borrower and at least one women entrepreneur per bank branch for setting up a green field enterprise. This enterprise may be in the manufacturing, services or in the trading sector. In case of non individual enterprise, at least 51% of the shareholding and controlling stake must be held by either an SC/ST or woman entrepreneur.

(h) ***Atal Innovation Mission (AIM):*** is an initiative by National Institution for Transformation of India (NITI) Ayog. The AIM intends to establish 'new' Atal Incubation Centres (AICs) across India by providing them with financial support. AICs would further support and encourage start-ups to become successful enterprises. They would provide necessary and adequate infrastructure along with high quality assistance or services to start-ups in their early stages of growth. AICs would be established in subject specific areas such as manufacturing, transport, energy, health, education, agriculture, water and sanitation etc. Each AIC would be required to choose at least one area of specialization. AICs can be established in academic and non academic organizations including corporates/technology parks/industrial parks etc. Even individuals can also set up, provided they have a built up space of 10,000 sq ft. The financial assistance is to the tune of Rs. 10 crores for a period of five years.

Apart from this, AIM also sets up "Atal Tinkering Labs (ATL)" in academic institutes (schools) with a support of maximum Rs. 10 lakhs/school. ATL is a work space where young minds can give shape to their ideas through hands on do-it-yourself mode; and learn innovative skills. Young children will get a chance to work with tools and equipment to understand the concepts of STEM (Science, Technology, Engineering and Math). Also, AIM helps existing incubators to scale up/expand. The scheme envisages augmenting capacity of the established Incubation Centers in the country. It will provide financial scale-up support to established Incubation Centers. The scheme would radically transform the start-up ecosystem in the country by upgrading the established Incubation Centers to world-class standards. Yet another area of intervention by AIM is Grand Challenge Awards (GCA) with the objective of developing novel disruptive technologies that are ultra-low cost, low maintenance, durable and customized to the local conditions of India. AGC will award grand prizes to anyone who delivers in a timely manner the desired solution as per the challenge specific criteria[10]. .

(i) ***Rural Livelihood Business Incubators (LBIs):*** The LBI scheme was formally launched in March 2015 as a scheme for promotion of innovation, entrepreneurship and agro industry. The ultimate objective of setting up LBIs creation of jobs at local level and reduce unemployment. The salient features of this scheme include (i) setting up a network of incubation centers and providing all necessary support for their management (ii) undertake capacity building measures through a network of specialized

[10] Source: http://niti.gov.in/content/atal-innovation-mission-aim

consultants, conducting, surveys, organizing site visits, undertaking relevant studies and organizing workshops (iii) developing accelerator workshops and (iv) establishing start up fund managed by SIDBI[11].

(j) ***Legal frame-work for venture capital investing in India:*** Certificate of registration from SEBI is exempted for foreign venture capital investors. A Venture Capital Fund (VCF) can be created in the form of a trust, company or a body corporate. A VCF raises funds in the form of units. A unit being "beneficial interest of the investors in the scheme or funds floated by a trust or issued by a company including a body corporate". A VCF shall accept not less than Rs. 5 lakhs as minimum investment from each investor by way of issue of units and the VCF in turn will invest the pooled funds in various schemes with a minimum contribution in each scheme of Rs. 5 crores. Not more than 25% of the corpus can be invested in one Venture Capital Undertaking. At least 67% in unlisted equity shares or equity linked instruments of VCU. A VCF is not a Non Banking Financial Company (NBFC).

(k) ***Legal framework for angel investing in India:*** Angel fund investments are in the range of Rs 50 lakh to Rs 5 crore. Angel funds are to be invested in a company for at least three years. Angel investors need to invest in companies not older than three years. Investee company should be unlisted and with a maximum turnover of Rs 25 crore. The investee company may not be related to a group with a revenue of greater than Rs 300 crore. The fund must not have any family connection with the investee company. No angel fund scheme may have more than 49 investors. The above are included as main features of new SEBI guidelines.

52. Objectives of the sub-component: The broad aim of this sub component is to facilitate emergence of more and more agro based enterprises from the project Districts and providing **(i)** short term short term support **(ii)** medium term business development and management support and **(iii)** long term intensive incubation support to existing as well as new and start up enterprises including FPOs. The EDPF will provide both pre and post investment support for agri entrepreneurs. This will include, among others, market scanning for business opportunities; conducting market and value chain studies of identified commodities; establishing and operating mentorship programs; scouting new technologies, including climate resilient technologies; assisting small and medium entrepreneurs to prepare business and financial proposals; providing business readiness and business planning support to MSMEs; and providing incubation services to emerging agri entrepreneurs. It will also organize agriculture policy seminars, thereby providing a forum for relevant stakeholders to discuss improvements in the agribusiness investment climate.

53. The EDPF will have a defined role in terms of analysing conditions suitable for emergence of new and existing agri enterprises and extending need based support to agri enterprises to take off and accelerate through incubation. All MSMEs in agribusiness sector will be eligible for support from EDPF.

54. The short term support (4-5 months, mainly pre investment) also referred as virtual[12] incubation is highly relevant for countries with poor or low levels of infrastructure, rigid systems of governance, and markets where there is a significant disconnect between public and private sectors in the areas of innovation and entrepreneurship. States with burgeoning youth populations, where otherwise an entrepreneurial ecosystem is latent, can benefit from virtual incubation. Dynamic leadership is essential to the running and continuation of these activities. Assam to an extent relates to the abovementioned situation. InfoDev goes on to mention that virtual incubation is the need of the hour for rural areas, as in urban hotspots, incubation facilities are provided by ample number of physical incubators. Proposal templates for accessing light touch support by start-up and existing entrepreneurs are given at *annexes A-2(a) and A-2(b).*

[11] *Source: http://msme.gov.in/WriteReadData/Whatsnew/MSME-ASPIRE-FINALBOOK.pdf*
[12] Virtual Incubation is a form of incubation usually provided to remote clients

55. The **business development support (mainly post investment)** of around 11-14 months under vertical II will include access to finance, business plan preparation and improvement, support in elevator pitch, business advice, cash flow management, regulatory compliances, financial management, general and specific mentoring, technology, training etc.

56. The EDPF will work to absorb initial shocks which a typical MSME in agribusiness will have. These shocks may range from product/market failure, change in food habits, buying behaviour etc. This way, it will reduce the failure rate of agribusinesses in the state (simultaneously increasing the success rate of existing and new agro enterprises).

57. The EDPF will create a body of knowledge, informative network of producer / market linkages through *state agribusiness sector scan study* and collation of the available knowledge base as Entrepreneurship Modules*.* EDPF will also act as resource agency for training of ATMAs on Value Chain Development Plans (VCDPs) and other market oriented trainings.

58. Apart from light touch and business development support, EDPF will promote agri entrepreneurship in the state through **Intensive Agri Business Incubation services (both pre and post investment)** [eg. Facilitating initial seed capital, mentor network, branding, shared resources- Quality Control (QC) labs, office spaces, shared amenities etc, facilitating technology commercialization/licensing mainly from public research institutions, through a longer term engagement with the needy start ups and entrepreneurs (18-36 months)]. Ultimately, it is expected to contribute to the Agri Gross Domestic Product (Ag.GDP) of the State.

Activities to be covered under the sub-component:

59. **Diagnostic study & Gap analysis:** In order to design an EDPF that yields the desired results, it is critical to gain an in-depth understanding of the key agribusiness entrepreneurship eco-system factors that influence i) the likelihood of an entrepreneur's ability to start and grow a competitive agribusiness, and ii) the feasibility of an agribusiness incubation approach.

(a) Therefore, as a first step, the project would conduct a scenario assessment on factors like geographical distribution of entrepreneurs, availability of markets, scalable production potential, access to finance, infrastructure and regulatory constraints and stakeholder sentiments. Specific questions to be asked with respect to these factors are given in table below. The process of answering these questions is typically achieved through a combination of desktop research; in-country interviews and multi-stakeholder interactions; and a survey of entrepreneurs that fall in the intended beneficiary category. In order to build local ownership and commitment the process is usually kicked off and concluded with a multi-stakeholder workshop, inviting inputs and discussion around each of the criteria.

Indicators for assessing the feasibility of implementing an agribusiness support program

Indicator	Specific Questions
Geographically Clustered Growth Entrepreneur Capacity (Pipeline/deal-flow)	Who are the growth-oriented entrepreneurs? How many are there? What size are the companies? Are they growing? What product categories are they in? Are they located within geographic clusters? Where? Why? What are the key "soft" areas they say they need assistance with? What do they perceive as the most significant barriers to growth?
Scalable, Accessible and Viable Markets	Can domestic and/or regional markets be identified that are scalable, accessible and viable, now and in the future? Who are the buyers of the value added products? What do they see demand for? What needs to be addressed to increase purchasing from local companies?
Scalable Production Potential (with comparative advantage)	Are there agricultural subsectors and value chains with known comparative advantage(s) that offer sufficient production of adequate quality within economic reach of processors? Can this be increased (if required) to facilitate beneficiation expansion?
Access to Finance	Does suitable, accessible funding exist, or can it be facilitated, for development, R&D, IP management, commercialization and expansion?
Infrastructure Constraints	Is there sufficient reliable infrastructure available? Is it affordable?

Indicator	Specific Questions
Regulatory Constraints	Is the regulatory environment conducive for entrepreneurs to take advantage of the value-addition opportunity?
Clear, Ready Stakeholders	Are there strong stakeholders that are committed to promoting agribusiness entrepreneurship? Can they positively affect the likelihood of implementation?

(b) Diagnostic study will be followed by "**Gap analysis**" of financial, technical and entrepreneurship/MSME support services available to agribusiness entrepreneurs vis-à-vis the opportunities, needs and challenges expressed. Examples of relevant information providers could be business incubators, accelerators, Business Development Services (BDS) providers, technology extension providers, grant schemes, business angels, funds, farmer collectives and banks etc. Here it is important to focus on the specific services being provided to entrepreneurs and specific gaps existing rather than focusing on portfolio of services and portfolio of needs. The EDPF will aim at filling the gap of incubation services required by MSMEs needing services like BDS, tech transfer, consulting, market linkages and technical assistance. Some of the possible gaps which may emerge after the diagnostic study in project districts are lack of quality BDS providers, finance, market information and intelligence etc. Eligibility and Selection criteria may be further refined based on the results of the diagnostic study carried out by the consultant hired for setting up and managing the EDPF.

60. Market scanning for business opportunities (& preparation of generic b-plans): As part of pre investment support, EDPF would scan the market for potential opportunities for entrepreneurs to participate in; list out potential areas of investment using well defined criteria; based on this undertake in-depth study of individual business opportunities and prepare a docket with bankable projects defining the investment needs and potential that could be taken by the entrepreneurs (along with techno commercial feasibility). *EDPF will prepare generic business plans for the identified investment opportunities which should be technically, financially and environmentally sustainable*. Though these business plans will be generic in nature, EDPF will ensure that these business plans have a realistic market assessment including demand assessment, technology profiling, raw material sourcing, logistics needed for sourcing raw material, capacity utilization for different scenarios, land requirement, statutory clearances needed for operating the business, license requirement, realistic assessment of investment and working capital needs, possible sources of funding including ways of leveraging various government schemes/subsidies. These generic business plans should also have detailed financial analysis including cash flows, sensitivity analysis, risks and possible mitigation strategies, analysis of competition and construction phasing. As these business plans would be generic and for optimal capacities they can be fine-tuned to the scale, investment, technology needs of the entrepreneur. 20 generic business plans will be prepared by EDPF HO team with inputs from SO teams.

61. Refining & conducting value chain study of identified commodities: EDPF shall refine the existing value chain studies. Over and above this, few more commodities will be taken up for value chain studies. The study shall include following activities, but not limited to: (i) participatory meetings with value chain stakeholders of each cluster such as – producers, aggregators, transport facilitators, storage facilitators, commission agents, wholesalers, retailers and ultimate consumers, (ii) analysis of potential for new value chains, volume & value of the selected crop with respect to its production, postharvest management practices, processing, storage, transport and marketing, (iv) analysis of the data / information collected from various reliable sources, (v) feedback from market participants and other relevant agencies, (vi) understanding on the role of stakeholders (vii) cost contribution analysis per stakeholder (viii) Margins at each level of value addition (ix) Gaps and issues in value chains (x) suggested intervention (xi) SWOT analysis for each value chain (xii) PESTEL (political, economic, social, technological, environmental and legal) analysis and SWOT analysis for interventions suggested. (xiii) Comparative study of stakeholders' role and cost contribution in each cluster separately.

62. Developing and operating a robust mentorship program

(a) **Establishing Mentor Network:** EDPF will identify and nurture an ecosystem of mentors and mentees. EDPF will be responsible for reaching out to and preparing a list of well-established entrepreneurs/ subject matter experts, academicians, technocrats, angel investors, etc who could mentor the emerging entrepreneurs- advising them on technical and commercial aspects of running a business. The EDPF will anchor this mentor network and will develop a mentors' directory containing detailed profiles of around 20 mentors. The development of mentors' directory will be completed within first 18 months of its operation by EDPF. Guidelines for identifying and selecting mentors will be developed by EDPF and shared with the project authorities for their approval. EDPF will develop mentor training modules so as to standardize the services rendered by mentors. EDPF will also develop online mentoring platforms. EDPF will give inputs on payment modalities, if any for the mentorship program. The mentorship services provided by mentors will in most cases be pro-bono. However, in certain special circumstances, these may be paid services. If an incubatee in the intensive agribusiness incubation program avails specific mentorship services, the charges will be paid by the incubatee. EDPF will only be a facilitator.

(b) **Mentor Coaching:** Mentor coaching will be conducted for three days in a year using the training modules developed for the purpose. Need based resource persons may also be invited from outside for coaching the mentors. These coaching sessions will be done at HO.

(c) **Mentor-Mentee Workshops:** EDPF will hold a series of workshops wherein the potential entrepreneurs and their mentors would interact and exchange ideas on establishing, developing and running new businesses and developing, improving the existing businesses. Issues that arise from these workshops that directly affect the "ease of doing business" should be flagged so that these can provide information for undertaking policy changes. Based on the interest and seriousness of the entrepreneur, EDPF will also facilitate one on one discussion with the mentors. EDPF will also invite commercial banks to these workshops, so as to establish a rapport between the entrepreneurs/start ups and the banks. Some of the interested bankers may also act as mentors. Mentor Mentee Workshops will be conducted at sub offices. Tentatively, in years 2, 3 and 4, one workshop at each sub office and in years 5,6 and 7, two workshops at each sub office will be conducted.

(i) **Expectations from the Mentor (illustrative list)**

- Should be a person with ample experience in the area selected for mentorship and should be successful in the area of expertise.
- Should be able to devote sufficient time for the activity.
- Should be passionate and be able to develop good relation with the mentee for smooth transition.
- Should be accessible as and when required.
- Should provide constructive and timely feedback.
- Should provide training to mentee on need basis.
- Should provide at least one seminar/webinar to mentee(s) through EDPF
- The services provided will be on pro bono basis (unless under special circumstances), Reimbursable charges will be taken care by EDPF.

(ii) **Expectations from the Mentee**

- Should have the right kind of attitude towards the program
- Should be genuinely interested in the business venture activities
- Should be passionate to undertake new opportunities and implement as agreed

- Should have the risk taking ability

(iii) **Benefits to mentor:**

- Mentors will get retainer-ship fee on confirmed assignment.
- Mentors will get financial benefits as per the agreement between the mentor and mentee.
- Mentors will get recognition through awards based on their performance.
- Recognition by incubatee and public for creating successful ventures.

(iv) **Benefits to Mentee**

- Mentee will get technical and business counseling
- A platform to work with experienced and result oriented persons and to shape their ventures
- Mentee will get competitive solutions for his venture/idea

(v) **Evaluation of Mentors:** Following can be the ways to evaluate the performance of the mentors:

- Use client performance data to evaluate the impact of mentoring
- No. of successful ventures started by the mentors within stipulated time period
- Feedback from the mentee.

63. Technology Dissemination Seminars: EDPF will identify promising technologies from both public as well as private sector including research institutions for licensing to agri entrepreneurs and other interested value chain players. These technologies should be "off the shelf technologies" and ready to be commercialized or already commercialized. Through Technology Dissemination seminars EDPF will bring together, both technology suppliers (licensors) and technology seekers (potential licensees) on the same platform and facilitate channelization of these technologies through agribusinesses to farmers' fields. Each such seminar will be of two days duration and will be conducted at state level (preferably Guwahati) annually (starting year-1) upto year 6. Hence total 6 seminars will be conducted through the project period.

64. Facilitating Access to Finance: EDPF will facilitate one on one dedicated meetings between entrepreneurs and commercial banks in order to facilitate access to finance (both investment as well as working capital). Every effort will be made in order to provide information on access to commercial loans. As mentioned earlier, various platforms will be leveraged to facilitate interactions between commercial banks and entrepreneurs. The feedback from entrepreneurs, bankers and other such stakeholders/ networks will be channelized to relevant authorities/ forums such as State Level Bankers Committee (SLBC) etc., in order to initiate discussions on streamlining procedures for accessing bank loans, funds, etc. EDPF will also be responsible for facilitating MoUs between the project and consortium of banks, with the objective of reaching common understanding between the project and the banks with regard to the support to be provided by the respective parties to the entrepreneurs facilitated under the project.

65. Enterprise Outreach: The objective of the enterprise outreach program is to disseminate information on viable business opportunities and also build awareness and interest amongst the potential entrepreneurs to facilitate growth of their enterprises. These enterprise outreach efforts would comprise of:

a) **Information & Communication Campaign:** will comprise of concerted communication efforts on awareness building about EDPF and the services provided through a host of channels like newspapers, local agricultural magazines, newsletters, mass mailers, advertisements,

distribution/sending out of flyers, pamphlets, brochures etc for specific agribusiness sub sectors/ opportunities. The objective of these campaigns will be motivating the potential entrepreneurs to avail the services of EDPF rather than just education. The campaigns will be carried out by centrally by the HO team covering all project areas. One campaign each year is planned throughput the project period.

b) **Workshops for Industry Associations**: One workshop each year will be organized for Industry Associations[13]. These workshops facilitate pear learning among industry associations and resource optimization. These workshops will cover not only business fundamentals to expand, diversify or modernize businesses by individual cluster members but also synergies which can be achieved to develop their businesses as groups. Some of these workshops could be held in collaboration with national, state level industry consortia/association (like FICCI, ASSOCHAM, CII, FINER). The workshops will be conducted by HO team however, the Industry Associations/members will be mobilized by respective sub offices from their regions.

c) **Buyer-Seller Meets**: which are structured in order to promote the products and services of agribusinesses being promoted in the state. Apart from offering increased visibility, these meets also serve the purpose of creating awareness about the market and connecting enterprises to distant but relevant markets. These meets could be commodity or commodity group specific, either fresh or primary processed. These will be organized in association with ATMAs.

d) **IT based outreach tools**: Apart from the aforementioned efforts, the EDPF will also explore and leverage other tools such as mentor webinars and best practices webinars for disseminating relevant information to needy entrepreneurs. One mentor webinar and one best practice webinar will be conducted each year.

NB: above listed activities at a-d will be conducted at State level by HO team with inputs from SO teams.

66. Business Readiness and Business Planning Support: A "bankable" business plan depends on solid financial planning, which in turn depends on an understanding of business finance (e.g., financing sources and financial statement analysis). MSMEs that lack financial capability are unlikely to develop a business plan, and consequently will not seek external financing (or will use informal sources) or will be denied credit by financial institutions. They are less likely than their financially literate peers to grow to their full potential. At the same time, lack of business management skills and relevant market information is a key factor that limits the ability of SMEs to improve their productivity and take key transformational steps such as participating in the supply and distribution chains of larger firms. This will be achieved through

(a) EDPF will prepare a **Directory of Funding Organizations** as a ready reckoner for entrepreneurs to find best funding sources for their enterprise. This directory will contain the details of institutions/organizations providing funding support to agro enterprises like banks, micro finance institutions, venture capitalists, angel investors etc. This directory will be regularly updated and widely disseminated among the entrepreneurs.

(b) Training of Entrepreneurs and FPOs on the following (as applicable)-

(i) **Financial Strategy Development**: Financial planning is a critical activity for every business regardless of its age and size. For new enterprises, the preparation of financial projections is integral to the business planning process and identifies financial milestones on the roadmap to success. EDPF would be able to help the entrepreneurs by developing a model that accommodates multiple time periods (months, quarters and years) and handles all variables relating to sales, costs, resources and capital requirements.

[13] The project will facilitate formation and registration of around 17 Industry Associations (IAs). Details are covered in sub-component B1.

(ii) **Investment Preparation**: Trying to raise capital to support the enterprise can be a tricky affair especially for startups, enterprises based on new technology etc. From determining Entrepreneur's Company's readiness to investment preparation and capital infusion, EDPF team should bring the contacts and capabilities to connect directly with the investment community (commercial banks, various venture capital schemes, etc).

(iii) **Management Team Establishment**: The success of an innovation has everything to do with the team behind it. EDPF team would help entrepreneurs to establish a solid management team that will lead business in the right direction.

(iv) **Market and Competitive Analysis**: EDPF *market research team* (which will include the economist) would help entrepreneurs identify how far product reach might be. The team will conduct a competitive analysis that will explore the strengths and weaknesses of the competition.

Training on the above aspects will be provided to entrepreneurs in small batches of say 15-20 each. Need based external resource persons may be invited for such trainings. Starting 2nd year of the project, three trainings (one at each sub office) will be conducted every year. Hence, roughly 18 such trainings will be conducted during the project period of seven years.

67. Reviewing the b-plans of FPOs and IAs: Farmer Common Service Centres (CSCs) will be developed by FPOs. Similarly, Common Facility Centres (CFCs) will be developed by Industry Associations (IAs). B-plans for these will be called from the FPOs/IAs (as the case may be). These b-plans will be evaluated by the EDPF. The promising b-plans will be passed on to respective PIU, along with recommendations for further necessary action/disbursement of first tranche of fund for the purpose. The following major factors will be taken into consideration while evaluating the b-plans of FPOs by EDPF

- Produce / product/ service portfolio proposed in the plan
- Robustness of assumptions
- Operational Plan for undertaking proposed interventions
- Marketing Strategy
- Proposed cash flows
- Sensitivity analysis

68. The check points in the proposals from FPO would be catchment area, degree of processing (primary, secondary, tertiary), number of members, land details, on ground verification, proposal vetted by service provider of FPO, commodities to be handled, details of machinery & cost, raw material availability & sourcing, total project cost, entrepreneur contribution, financial analysis (CB, break even, IRR etc), market linkages, proposed infra, other funding sources finalized/committed etc.

69. Creating a robust knowledge base: EDPF will be responsible for the following:

(a) Preparing an operational knowledge base that could be used by an entrepreneur throughout the life cycle of the enterprise (entrepreneurship modules). The knowledge base modules should comprise of fundamentals of business management including strategy, operations management, organizational behaviour, human resources management, structure of the organization, products and markets, operations, finance including major expenditures, sources of financing across the stages of the life cycle of the enterprise (from start up to mature business and expansion). Knowledge base should also cover fundamentals of accounting, sales, marketing, promotion, branding, distribution, logistics etc. Ideally, these modules should be prepared by HO team, with inputs from SO teams in first year of operation of EDPF.

(b) EDPF will also develop *tool kits*. Examples could include (i) Mentor tool kit (ii) Investor tool kit (iii) Starting your own business- a tool kit (iv) Tool kit for gender mainstreaming in agri entrepreneurship etc. These are planned to be developed in first two years by HO team with inputs from SO teams.

70. Setting up, staffing and management of EDPF Offices: The EDPF HQ office will be set up in the vicinity of PCU ARIAS Society at Guwahati. It will have three sub offices- one in upper Assam (Jorhat), one in lower/central Assam (Nagaon) and one in Barak valley (Silchar).

(a) **The staffing position at EDPF HQ office will be as follows:**

Sl.	Position	Qualifications and Experience	Roles and Responsibilities
1	Team Leader & Agri Business Specialist	Graduate in Agriculture or allied science with Post Graduation in Agri Business Management (ABM)/MBA-ABM/MABM/ PGDBM- Agri Business Management/ PGDABM from reputed institute/ University with around 15 years of experience in agri business, investment promotion, value chain promotion, agricultural marketing	• Identify new and potential important agri marketing / agribusiness models that are emerging in state, and if considered significant enough, (i.e. having potential for large scale replication) commissioning studies so that their effectiveness, impact and profitability is well understood by the broader agriculture and agri business and rural finance sector. Conduct participatory workshops and seminars for representatives of the public sector, private sector, and non-government organization (NGOs) to enhance their awareness and understanding of agribusiness concepts, needs and opportunities; and to obtain feedback on business procedures, access to credit, marketing system deficiencies, and other factors that cause market distortions. Using the feedback, carry out a rapid assessment of the agribusiness sector from input distribution to production, harvest, post-harvest, processing, and marketing to identify significant constraints and potentials; and recommend measures to correct the constraints and to effectively exploit the potentials disseminating the information to sub-offices. • Create a role as a point of contact and conduit for information and networking between the agribusiness and trading sector, and their associations and the project, the Government of Assam and the EDPF sub offices; • Ensure that the successes and failures of the new agri marketing models are rapidly understood and the key issues are rapidly disseminated to the financial institutions, entrepreneurs and mentors. • Feed information on market opportunities, business opportunities into the communication network in the project, so that field staff are well informed, and can advise their clients and capture from field, the feedback on success/failure and modify messages and activities accordingly. • Assess the factors influencing comparative and competitive advantage of selected commodities and recommend measures for enhancing competitiveness. • Analyze existing and future needs for quality assurance systems to enable agro products to comply with the hygienic, phyto-sanitary and social requirements. • In consultation with private sector stakeholders, capture maximum potential of the Government's development strategies, policy and regulatory framework, and their conduciveness to agribusiness. Identify opportunities in the legal and policy framework to improve the enabling environment for agribusiness. • Dissemination of the findings of various studies commissioned by the Project & EDPF to the stakeholders in general and to the EDPF Sub office teams in particular. • Understanding the analysis of a series of business case studies that will be carried out, new marketing, models that will emerge as a result of the project i.e. CSC, E- markets, and local aggregators of the product to access the new financial instruments like warehouse receipts and ensuring that the findings are disseminated to entrepreneurs, financial institutions, agri

Sl.	Position	Qualifications and Experience	Roles and Responsibilities
			businesses and farming sector and so also to the EDPF Sub offices • Provide a commentary on markets, product and evergreen business models and on the different financial institutions and their product on the project website/portal. • Coordinate with technical agencies and financial analysts to facilitate handholding of PCs in a systematic and time responsive manner. • Review reports and aid Project initiatives in agribusiness, and small- and medium enterprises (SMEs) development in the State to identify areas that have received Project support.
2	Agricultural Finance Specialist **HQ, EDPF**	Post Graduate in Economics or MBA / PGDBM in Finance from a recognized University with around 10 years experience in Agri Finance	• Scouting for new funding sources for agri MSMEs apart from traditional bank financing and connecting the needy entrepreneurs to these non-traditional funding sources through the EDPF sub offices • Create a role as a point of contact and conduit for information and networking between the agribusiness and trading sector, their associations, the financial sector and the project, the Marketing Board and the sub offices, so that policy, trading and farming needs can be better tuned with one another;
			• Create a role as an interlocutor between the financial sector, the project and the government. • Understand the modus operandi of the financial institutions, the new financial products and loaning criteria that are emerging; • Encourage the financial sector to understand the financial needs of the agri- business and trading sector and seek to increase the access of finance; • Provide a commentary on policy and financial regulations, and on the different institutions and their products available in the project geographies; • Sensitize the financial sector to new business models, investment opportunities and potential alternatives and newer financial products that will benefit the farming, agri-business and agro-trading sector including the input side of agri value chain; • Ensure that an understating of financial products and institutions in entrepreneurship is gained by project staff and particularly by ATMAs & DICCs so that they can advise their clients accordingly; • Be in close liaison with Agribusiness SME Fund, understanding their requirements and providing necessary inputs from project locations
3.	Agricultural Economist	Post Graduate in Economics/ Agricultural	• The Agricultural Economist will carry out research and information gathering for the Agribusiness Specialist and Finance Specialist and act as an alternate on their behalf.
		Economics or Commerce from a recognized University with around 10 years experience Economic & financial analysis	• In conjunction with the agribusiness and marketing specialists, analyze cost of production and returns for agricultural crops and agro products. Using economic rate of return, domestic resource cost, and effective protection rate or other appropriate approaches, conduct market analysis to assess the comparative advantage and competitiveness of the products in the domestic and international market. • Analyse the marketing costs for crops and agro products and recommend measures to achieve greater profitability and competitiveness. • Assess the implications on competitiveness of current policy and regulatory initiatives for the development and growth of the agribusiness sector by comparing the cost of services provided by the public and private sectors and NGOs; recommend measures for enhancing competitiveness of the agribusiness sector. • Estimate the economic benefits from reductions in transaction costs resulting from simplifying the procedures for business start-ups, operations, and access to credit, improvements in marketing systems, and other constraints to be addressed. • Carry out economic and financial analyses, including a least-cost analysis of alternative institutional arrangements, to determine the viability of the

Sl.	Position	Qualifications and Experience	Roles and Responsibilities
			proposed enterprises and the distribution of the investment benefits among stakeholders; carry out sensitivity and risk analyses.
4	Agricultural Marketing Specialist	Graduate with MBA (Agribusiness)/MBA (Agri Marketing and Cooperation) / PGDABM from a recognized University around 10 years experience in marketing	• Review past and present initiatives in marketing of the various agricultural commodities and products in the State, advising the project authorities on simplifying and improving the same. • Help the regional teams conduct participatory workshops and seminars and guide discussions to obtain feedback on deficiencies in agricultural marketing systems that inhibit efficiency and profitability, including but not limited to marketing information and intelligence, transportation and post harvest infrastructure, packaging, standardization and grading, quality assurance and meeting the requirements of international buyers including the WTO and other trade initiatives. • To recommend appropriate management techniques for rural market operations, assess the need for detailed commodity-oriented markets. • Determine the need for market information and intelligence systems at Project and the grassroots levels, to help agribusiness enterprises identify domestic and international market opportunities, how and where these systems should be set up, and the capacity building required for operating the systems. • Assess the potential for establishment of farmers' organizations for marketing and recommend an institutional framework for accomplishing this in conjunction with the regional teams. • Examine the existing market systems for agricultural inputs including seeds, pesticides, fertilizers, and other inputs, and recommend strategies for improving their availability.

(b) **Staffing position at EDPF sub offices will be:**

Sl.	Position	Qualification and Experience	Roles and Responsibilities
1	Team Leader & Agribusiness Expert	Graduate in Agriculture or allied science with Post Graduation in Agri Business Management (ABM)/MBA-ABM/MABM/ PGDBM-Agri Business Management/PGDABM from reputed institute/University with 10 years of experience in agri business, investment promotion, value chain promotion, agricultural marketing	• Conduct the participatory workshops and guide discussions to obtain feedback on legal, administrative, procedural, and other constraints, including technical to start-up and profitable operation of agribusiness enterprises. • Based on the feedback, study the planning, start-up, registration, and operation of small and medium agribusiness enterprises to identify the primary inefficiencies, barriers to entry, factors inhibiting profitability, and other underlying problems. • Provide information, advice, and acting as a two way conduit for information between field staff and the EDPF HQ and PCU staff; • Act as a conduit for the exchange of information between the project, HQ and field staff, the agribusiness community, and convene meetings so that best practices and field lessons are exchanged; • To have a network with the local agri-business community, their trade and professional associations so that business opportunities and marketing linkages can be fed into the project network • To organize, in conjunction with the local agri-business community, their trade and professional associations annual workshops and ensure that the information provided is relevant and responds to the needs of the local agribusiness and trading community; • Also to coordinate with Economist to prepare the business proposals and follow up to get them sanctioned • To review the business plan prepared by farmer producer companies for CSCs and under the Business Development Support (BDS) vertical • To identify the technical and financial input required by the CSCs and other agro enterprises in the region and guide them accordingly. • Conducting participatory workshops and seminars as per instructions from Head Office & guide discussions to obtain feedback on deficiencies in

Sl.	Position	Qualification and Experience	Roles and Responsibilities
			agricultural marketing systems that inhibit efficiency and profitability, including but not limited to marketing information and intelligence, transportation and post-harvest infrastructure, packaging, standardization and grading, quality assurance and meeting the requirements of international buyers. • To recommend appropriate management techniques for rural market operations, assess the need for detailed commodity-oriented markets. • Determine the need for market information and intelligence systems at the grassroots levels in the catchment area of sub office, to help agribusiness enterprises identify domestic and international market opportunities, and building their capacity to realize these opportunities. • Reviewing the b-plans of FPOs and Industry Associations
2	Agricultural Economist	Post Graduate in Agricultural Economics/Economics or Commerce from a recognized University with around 7 years experience Economic & financial analysis	• The Agricultural Economist will carry out research and information gathering for the Agribusiness Expert and act as an alternate on his behalf. • In conjunction with the agribusiness and marketing experts, analyze cost of production and returns for agricultural crops and agro products. Using economic rate of return, domestic resource cost, and effective protection rate or other appropriate approaches, conduct market analysis to assess the comparative advantage and competitiveness of the products in the domestic and international market. • Analyse the marketing costs for crops and agro products of the region, and recommend measures to achieve greater profitability and competitiveness, in turn passing on this information to the EDPF HO. • To carry out economic and financial analysis of dominating agro enterprises in the region, replicating the success stories and provide suggestions to entrepreneurs where such deficiencies exist. • Estimate the economic benefits to the agro enterprises in the region, from reductions in transaction costs resulting from simplifying the procedures for business start-ups, operations, and access to credit, improvements in marketing systems, services provided by EDPF and passing on the information to HO for collation. • Developing alternate farm plans for existing farm models (being followed by majority farmers) and disseminating these at various farmer forums and also passing on to HO. Testing the actual benefits accrued by farmers by adopting these alternate farm plans and maintaining a record of cumulative benefits so gained by the farming community in the region.
3	Agricultural Marketing Expert	Graduate with MBA (Agribusiness)/MBA (Agri Marketing and Cooperation) / PGDABM from a recognized University around 7 years experience in marketing	• Review past and present initiatives in marketing of the various agricultural commodities and products in the region. • Studying new and emerging agricultural marketing, establishing their feasibility and viability, and replicating the successful ones keeping in loop the EDPF HO • To market the entrepreneurship development and support initiatives of the EDPF and APART in his catchment area districts • Will maintain close liaison with AME of ATMAs in his catchment districts, disseminating information on EDPF initiatives to progress farmers, farmer entrepreneurs and other value chain players • Documenting success stories of innovative agri entrepreneurship and disseminating them in the region with an objective of replication • Be in close touch with the market intelligence cell of the project and disseminating useful information to farmers and agro entrepreneurs as deemed fit on a regular basis • Be the face of the EDPF sub office and actively promote it through various channels etc. • Providing necessary feedback on institutional and policy level challenges in agricultural marketing in the region, to the HO, so that same can be routed to Govt and project authorities and suitable remedial measures can be taken.

71. Classification of Indicative Services Provided by EDPF

Service	Short Term Support	Business Development & Management	Intensive incubation support
Pre investment	Generic b-plans, customized b-plans, introduction to technology, basics of entrepreneurship, preliminary training, idea proofing, awareness and sensitization on funding sources, linking to higher education institutes	Fund raising and access to venture investors, business angels, bank credit, facilitating for accessing agribusiness SME fund, Business planning for expansion, modernization, diversification, knowledge modules on agri entrepreneurship, investor outreach programs, trainings, accounting and financial management, proof conceptualization, feasibility analysis, pitching sessions, Financial Strategy development, Investment preparation	Office space and amenities (with security), shared services, studies and surveys, customized entrepreneurship modules, Access to finance (mainly non conventional sources), investor outreach programs, prototyping, elevator pitch, crowd sourcing, linking to subject specific institutions,
Post investment	Technology, short term trainings on business expansion, virtual communities, e-learning,	Mentorship, Technology, IT tools for business development and expansion, B2B meetings, Buyer seller meets, customized trainings, segmenting, targeting, positioning of product/service, customer relations, human resource development/team building, procurement, sales & distribution including export training, rapport building, market research, management team establishment	Above+ Technology licensing, mentorship, testing, trails, product launch, business tracking services, B2B meetings, Buyer seller meets, training and exposure visits, IP protection, regulatory compliance, legal assistance, logistics & channel mgt, internships, advisory boards, brand building, support in drawing vision & mission statements
Pre & Post investment	Combination of above two	Combination of above two	Combination of above two

72. Agribusiness Incubation Services to the needy entrepreneurs :

(a) This service will be a part of vertical III and will have prolonged engagement of 18-36 months, with the clients/incubatees. Here the level of engagement will be much deeper compared to vertical II. For incubation services, the EDPF will focus on existing enterprises initially (both in formal and informal sectors), who already have processing facilities of one form or another, which may be improved and expanded with business support and financing. In future, EDPF will also focus on new/ start-up businesses as well as enterprises on the input side of agri value chain. Once clients are selected, they will be provided intensive incubation support like business support, office space support, which will be tailored to their unique needs on a case-by-case basis, and will be payable during the tenure in the EDPF and also later on success sharing arrangements. For this, each sub office of EDPF will have incubatee spaces for five incubatees. Short Term Support services like awareness and pre-incubation services (involving workshops and advice to prospective EDPF clients prior to rigorous selection process) will largely be at minimal cost.

(b) Whether entrepreneurs need guidance to get started or help polishing an existing plan, the EDPF team should be able to provide the assistance needed to perfect this important business basic. The EDPF would support identified agri-entrepreneurs, in the preparation of viable financial proposals so as to convert the interest of the agri-entrepreneurs to actual investment. The services would include, preparing bankable proposals that are financially viable; financial strategy development and investment preparation. It is expected that the EDPF would help the identified agri – entrepreneurs for accessing credit from formal institutions, both conventional (banks) and non conventional (venture capitalists, angel investors, SME funds, innovation funds etc).

(c) The EDPF incubation services, will encompass the following:

- Business management advice

- Market development and access, along with domestic, local, and regional branding and compliance
- Business advice and capability development, including pre-incubation
- Financing brokerage for seed, as well as for growth financing
- Access to office, meeting, promotion, and testing facilities

(d) These streams of services encompass business coaching, market research, marketing and procurement facilitation, technology identification, facilitation, training and financial services. These services will provide clients with a comprehensive tailored offering designed to position them for growth in existing and new markets. In addition, the EDPF will play an active role in promoting successful introductions and marketing of technological innovations in order to stimulate broader take-up by other emerging agro-processors. It will also actively communicate policy and regulatory constraints faced by high-growth potential value adding processors to government officials, financing constraints to the financial sector, and skills and tech needs to academia and research institutes. In this way, the EDPF will help strengthen the overall innovation and entrepreneurship ecosystem thus positively affecting the ability of the entrepreneurs to succeed in the marketplace.

(e) **Market and Technical Knowledge**: Any initiative focused on enabling the growth of agribusiness enterprises must start with market and technical knowledge, which includes business and technical training, industry seminars, and market development. The EDPF needs to invest in developing internal market development capacity—an area that is generally deficient in Assam. The EDPF will do the following:

- Help companies gain agribusiness knowledge through technical and business training and industry seminars
- Assist companies with exploiting existing domestic markets, helping them to navigate and put in place efficient distributions systems
- Assist export-ready companies to exploit international markets, navigating complex and limited export pathways
- Help companies to identify, target, and test new markets and new products
- Facilitate access to available packaging and address the deficiencies in the packaging options available, including co-packing arrangements for the international market
- Help companies with market research to assess opportunities and to position themselves in the market, with current and new high-value products, including co-branding and co-marketing options bringing together private sector expertise in the business in a symbiotic manner
- Help enterprises in identifying and accessing inputs and supplies and exploring vertical and horizontal integration
- Facilitate procurement of common commodities in bulk for resale to processors
- Help companies to identify, target, and conclude sales deals in more lucrative markets
- Facilitate trade show activities

(f) **Advisory Services and Networking**: The advisory and networking portfolio includes mentoring, coaching, and advice on business management, technical, and regulatory issues. Specific service offerings include value chain partner facilitation and networking. Although EDPF staff will provide the core advice, it will need to create a strong mentoring, coaching, and partner network where external capability exists. The EDPF will do the following:

a. Provide focused support in accounting, business strategy, sales, market development, and other aspects of business management. This support will be provided by internal staff and also outsourced to specified experts.
b. Negotiate and facilitate access to specialized equipment for new product development and testing.
c. Facilitate processing technology improvements, hygiene improvements, standardization, testing, and access to the latest processing knowledge.
d. Access to packaging facilities, standards, and labelling for both local and international markets.
e. Create a network of support organizations that will be able to support entrepreneurs in areas such as registration, regulatory compliance, sector development, advocacy, R&D linkages, financing, packaging, testing, and certification and network support.
f. Work with local institutions to identify and meet local standards and with local consumers to identify standards that must be met.

(g) **Access to Facilities**: The EDPF would be operated state wide with a head office at or near PCU, APART, Guwahati, and three regional offices. At the district level, EDPF will actively coordinate with DICCs and ATMAs to scout its potential clients. EDPF will not invest in pilot processing or testing facilities, labs and equipment. Instead it will partner with the institutions whose infrastructure and facilities can be shared on rental basis.

(h) **Access to Finance**: Finance is a key constraint for growth. It is critical that the EDPF can facilitate better financial services to its clients. This significant gap needs to be surmounted for enterprises to scale and grow. The EDPF will work intensively with clients making them "finance ready" and then actively facilitate investment from a range of sources:

- Linking up with the Agribusiness SME fund setup under the project
- Linking with venture capital / angel investor network
- Bank financing including NABARD
- Various other schemes of GoI and GoA

73. Role Division for key tasks between Head Office and Sub-offices:

Sl.	Major Project Tasks	To be done at HO/SO	Remarks
1	Diagnostic Study	HO	With inputs from SOs
2	Gap Analysis	HO	
3	Marketing scanning and preparing generic b-plans	HO	With inputs from SOs
4	Refining existing VC studies and conducting new VCs	HO	With inputs from SOs
5	Establishing mentor network	HO	--
6	Mentor Coaching	HO	--
7	Mentor mentee workshops	SOs	--
8	Tech dissemination seminars	HO	--
9	Facilitating access to finance	SOs	With guidance from HO
10	Information and communication campaign	HO	In collaboration with SOs
11	Workshops for Industry Associations (IAs)	HO	In collaboration with SOs
12	Buyer seller meets	HO	In collaboration with SOs
13	Mentor webinar	HO	--
13	Best practices webinar	HO	--
14	Entrepreneur training	SOs	--
15	Entrepreneurship Modules	HO	--
16	Tool Kits	HO	--
17	Agribusiness Incubation services	SOs	With guidance from HO

74. Illustrative sequencing of first phase activities (24 months)

Month No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
FY	2016-17												2017-18											
Activity	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Setting up of EDPF HQ and Branch Offices																								
Diagnostic Study																								
Gap Analysis																								
Market Scanning & preparing generic b-plans																								
Refining existing VC studies and conducting new VC Studies																								
Establishing mentor network																								
Mentor coaching																								
Mentor Mentee Workshops																								
Technology Dissemination Seminars																								
Enterprise Outreach																								
Information & Comm Campaign																								
Workshops for IAs																								
Buyer Seller Meets																								
Mentor Webinar																								
Best Practices Seminar																								
Developing Directory of Funding Orgs																								
Entrepreneur and FPO trainings																								
Entrepreneurship Modules																								
Tool Kits																								

75. Budget: The tentative budget for seven years would be around Rs. 16 crores with breakup below-

Sl.	Activity	Total
1	Studies, surveys etc	60.00
2	Mentoring Program	30.00
3	Technology Dissemination	4.00
4	Enterprise Outreach	98.00
5	Business readiness & b-planning support	16.00
6	Setting up, staffing and management of EDPF HO	541.00
5	Setting up, staffing and management of EDPF 3 Sub offices	795.00
6	Creating a robust knowledge base	11.00
	Total	1555.00

76. Institutional and Implementation Arrangements

(a) The EDPF will be manned by a consultancy firm hired on a competitive basis and its procurement will be carried out by PCU by following World Bank procedures. The EDPF will have a Head Office at Guwahati and three sub offices, one each at Jorhat, Nagaon and Silchar so as to ensure sufficient outreach in the project geographies.

(b) The EDPF will work in close coordination with academic institutes, research institutes, other incubators, government and other supporting organizations like National Research Development Corporation (NRDC), Technology Development Board, National Science and Technology Entrepreneurship Development Board (NSTEDB), Asia Pacific Incubation Network (APIN), Indian STEPs[14] and Business Incubators Association (ISBA) etc. The work of EDPF will be constantly monitored by PCU.

(c) Quarterly review of the progress of EDPF will be carried out by PCU, ARIASS. EDPF will have to submit reports of the work accomplished and action plans to PCU regularly as per the results framework and assigned targets. Mid corrections will be carried out as per need.

(d) PCU shall have rights to give directions to EDPF for taking corrective steps so that the work is accomplished timely as per the contract / agreement between PCU & EDPF.

[14] STEPs: Science and Technology Entrepreneurship Parks

(e) EDPF will have to submit the proposals for release of funds to PCU with details of the budget provision, programs targeted and actual performance. PCU will release funds to Consultant/ Service Providers and they shall maintain the accounts of funds received and utilized.

(f) FPO Proposal screening/incubatee proposal screening etc will be done in two stages, first a preliminary screening and then a final screening. The results will then be passed on to PCU ARIASS. Decision of PCU, ARIASS will be final in this regard.

(g) EDPF will have a Governing Board, headed by the State Project Director (SPD), ARIAS Society and Team Leader cum Agribusiness Specialist as the Member Secretary. In the Governing Board, sectoral representatives of Policy Dialogue Group of Stewardship Council will be co-opt invitee members. Governing Board will meet at least once in 6 months. In addition, EDPF will also have an advisory body headed by the SPD and eminent personalities from agribusiness incubation fraternity & Stewardship Council as members. Few practicing MSME agro entrepreneurs will also be members of the EDPF Advisory Body. Advisory body will meet at least once in 6 months.

(h) EDPF will develop a policy document for strategic decisions which will be vetted by PCU, ARIAS Society and for day to day operations; an EDPF operations manual will be developed. This will also be approved by PCU, ARIAS Society.

77. Sustainability

(a) EDPF will collect nominal charges from beneficiaries/users (particularly for intensive incubation services) which will be accumulated as a corpus during the project period and may be invested as secure deposit. This amount will be used to sustain the activities after the project period. Indicative incubatee service charges/rentals will be included in the EDPF Policy document.

(b) ARIAS Society can apply to National Science and Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology (DST) for setting up incubator under the iSTED scheme. If selected, fair amount of fund is available for setting up the incubator which will ensure continuation of the activities after the project period.

(c) ARIAS Society can also apply for setting up Atal Incubation Centre under the Atal Innovation Mission of Niti Ayog, Government of India

78. Key output and intermediate level indicators

(a) **Results Chain:**

Activities	Sub Activities	Output	Outcome
1. Diagnostic study	Survey, analysis and report	Requirement of agribusiness incubation & entrepreneurship development services in the project districts finalized	Design of customized EDPF program
2. Gap analysis	Analysis of the Diagnostic Study Report	Loopholes in the development of agri entrepreneurship ecosystem identified	Strategy for plugging the loopholes in the development agri entrepreneurship ecosystem
3. Market Scanning for business opportunities & preparation of generic b-plans	Survey, consultations, analysis and report	Agri business entrepreneurship opportunities available in the state	Generic b-plans for entrepreneurs

Activities	Sub Activities	Output	Outcome
4. Refining of existing Value chain studies & taking up new VC studies	Survey, consultations, analysis and report	Commodity specific interventions & opportunities known	Commodity specific investments in enterprises
5. Setting up, staffing and management of Assam EDPFHQ and sub offices	Physical set up of EDPF Head Office and Sub Offices	Improved business incubation service being provided	Better entrepreneurial acumen achieved in the project Districts
	Recruitment of staff of Assam AEDPF		
	Management of operations and day to day functioning of EDPF		
6. Developing and operating robust mentoring program	Establishing mentor network & Development of Mentors' Directory	Incubatee technical knowledge facilitated	
	Mentor Coaching & workshops		
7. Technology Dissemination	Technology Dissemination Seminars		
		Promising agro technologies reaching agro entrepreneurs	
8. Providing agri business incubation services to needy entrepreneurs	Business management advice	Better agribusiness incubation ecosystem in the state	
	Market and technical knowledge		
	Advisory services and networking		
	Access to Physical facilities		
	Access to finance		
9. Enterprise Outreach	Information & Comm Campaign	Improved outreach and publicity of the EDPF	
	Workshops for IAs		
	Buyer Seller Meets		
	IT based outreach tools		
	Training and exposure visits of Incubator & DICC staff		
10. Business Readiness & Business Planning Support	Developing Funders/Investors Directory	Better readiness of the entrepreneurs for agribusinesses to take off	
	Entrepreneur training on financing, investment, team building, market & competitive analysis		
	Preparation of customized b-plans		
11. Creating a Robust Knowledge Base	Entrepreneurship Modules	Filling of knowledge gap of agro entrepreneurs	
	Tool kits		
	Business Performance Tracking System		

(b) **Results framework**

Indicator Name	Base-line	Cumulative Target Values						
		YR1	YR2	YR3	YR4	YR5	YR6	End Target=YR7
Amount of (bank) finance mobilized for beneficiaries (Rs. Lakhs) as a part of vertical II (BDS) Note^: Av investment size= 35 lakhs, Equity=65%, Bank loan=35%	0	0	980	1600	2080	2570	3200	3700 (roughly 35% of total investments in ag-enterprises)
Number of beneficiaries of short term support support[@]	0	180	350	540	720	900	1080	1250
Number of beneficiaries of business development & management services[#]	0	0	80	130	170	210	260	300
Number of incubatees graduating from long term intensive incubation program[$]	0	0	0	3	6	9	12	15

^: The figures are guided by the number of applications received and proposals prepared under similar programs in other states of India (eg. Maharashtra Agricultural Competitiveness Project)

@: Existing registered enterprises in APART Districts=2500 (app), target=50%--> 1250

#: Roughly, half of those benefitted in light touch program, should move to apply for business development support i.e. 625 (however others may also come). Half of these would be targeted as beneficiaries of BDS program which comes to roughly around 300

$: The figures are taken based on the table below

Sl.	Name of the Incubator	No. of years in operation	No. of incubatees graduated	Average annual number of incubatees
1	IKP Knowledge Park	11	30	3
2	Amrita TBI	8	50	6
3	VIT TBI	13	26	2
4	IITM RTBI	9	16	2
5	BIT TBI	9	14	2
	Average	**10**	**27**	**3**

79. Eligibility and Selection Criteria (indicative list):

Short term support	Business development and management support	Intensive business incubation support
Eligibility Any individual or team with a business plan (to start, expand, modernize or diversify) related to project commodities with either operations, market or sourcing from project districts	**Eligibility** Beneficiaries of short term support will not be subject to other criteria given below Individual or team with B-plan to start, expand, modernize or diversify in project districts[@] on project commodities in the following- Post harvest management with branding & marketing, agro marketing, value addition and processing in decentralized manner, providing farm services through agri clinics, agribusiness centres, custom hiring centres and market-led production, grading, packaging, branding etc	**Eligibility** • Beneficiaries of business development and management support will not be subjected to other criteria given below • Individual, team or a registered entity, working fulltime on the b-plan/proposal to start, expand, modernize or diversify the agribusiness in project domains and geographies[@] • Should demonstrate a need for intensive incubation support • Business references & market knowledge of the business • If team, should bring in various types of expertise required for the concerned agribusiness
Selection Should clear the screening posed by EDPF	**Selection** Should clear the screening posed by EDPF Committee set up for the purpose.	**Selection** Should pass the screening of the committee constituted for the purpose. Guiding principles for the Committee will be *inter alia* merit and uniqueness of the proposal, employment generation potential and synergy with APART & EDPF objectives.

@: Either sourcing or market or operations should be in the project districts

80. Risk and Mitigation Measures: The following risks are perceived and mitigation measures are given against them

Sl.	Perceived Risk	Mitigation Measure
1	Design failure	Enough scope is kept for making mid course changes and adding new activities as per need of the changing ecosystem.
2	Consultant/Service Provider failure	All the activities will be carried through expert service provider/consultants
		Continuous monitoring of the activities will be ensured.
3	Financial management irregularities	Release of funds in tranches maintaining financial discipline
4	Lack of funds with the incubated start ups and hence risk of failure	Agribusiness SME fund and other funding available from commercial banks, Govt schemes and other financial institutions will be explored. A funders directory will also be developed which will be regularly updated.
5	Regulatory hurdles may come in starting business	Single Window would be functional and in place (A1)
6	Non performance of the incubatees	Rigorous selection criteria for incubatees
		Writing and administering clear, written and understandable agreements
		Regular review of the incubatee performance, operations, work, action plans and mid course correction measures if necessary

Sub-Component A.3: Setting up of Investment Fund

81. This sub-component will aim to provide risk capital and technical assistance to agribusiness MSMEs with scalable ideas/innovations/business models and with a locus of activity in Assam. Access to risk capital is expected to allow some of the investees to graduate to high growth enterprises that will contribute to improved productivity and job growth in the sector.

82. Sub-Component Background:

(a) SME Funds are a prevalent model in developing countries, where they are set up like Private Equity (PE) or Venture Capital (VC) funds and invest in SMEs through a finite life vehicle. SME fund managers typically raise fixed pools of capital that are then invested in a diversified set of companies, often across many industries. The fund managers source deals by working with a network of intermediaries, developing business linkages and competencies in specific sectors, and by scouring a given market for investment opportunities. Apart from providing financing, these funds typically take a "capital plus" approach, in that they help the companies in their portfolios to enhance management capacity, improve market focus and presence, strengthen governance, and manage growth. Although PE investment styles may vary considerably, many firms seek financial returns by supporting and financing the growth of the companies in their portfolios. As such, these firms are widely linked to job creation.

(b) Investment funds with a development perspective often provide complementary donor-financed technical assistance structured as grants or zero interest loans. TA is provided pre investment and post investment to address targeted capacity constraints such as accounting/ financial statements, management information systems, governance, strategy etc. In providing and investing in technical assistance, investment funds open doors for additional investment, improved portfolio performance, and reduce financial and governance risks.

(c) Government intervention in PE/VC is not unusual; typically, intervention in the PE/VC ecosystem manifests itself through three key approaches. The first is a more traditional role for the government, where it helps create a conducive legal/regulatory and tax framework for PE/VC funds. The second, and more interventionist approach, is when the government recognizes that a lack of risk financing is, for example, undermining the innovation ecosystem and preventing innovative ideas with commercial potential from reaching market. In this case, the government may elect to play the role of a venture capitalist, justifying its intervention because early stage financing, while able to deliver impact, is well known to be consistently under-supported.[15] In fact, academic research finds government VC expands the total pool of financing for the market as well as at the enterprise level. A third mode of intervention, is the government-sponsored Fund of Funds, providing seed capital to PE/VC funds in the ecosystem, and building the capacity of both domestic fund managers and co-investors in the process.

83. Global Landscape of Agribusiness SME Funds

(a) Motivated by the renewed interest in supporting the agricultural sector in developing countries, public investors play a distinctive role in agribusiness investment funds allowing private investors to take risks and pursue investment opportunities ranging from farmer cooperatives, rural microfinance institutions to agribusiness SMEs. These funds often provide and even broader range of

[15] "The Effects of Government-Sponsored Venture Capital: International Evidence" by James A. Brander, Qianqian Du, and Thomas Hellman. Review of Finance (2015).

financial services than typical PE/VC funds, including short-term working capital and trade financing, subordinated loans, mezzanine finance and equity investments.[16]

(b) According to a recent study[17], there are over 60 funds managed by professional fund managers with a total of US$7.1 billion committed by both public and private investors in these funds. Of these, 19 funds invest mostly in larger agribusiness, 11 funds focused on agribusiness SMEs and 6 on producer organizations; their capital base was US$1.8 billion, US$250 million, and US$395 million respectively.[18] The funds focusing on Agribusiness SMEs and producer organizations tend to be smaller in size ranging from US$10 million to 40 million. They typically make smaller investments, mostly less than US$3 million, and pursue development impact often by accepting sub-commercial return. Debt is a main instrument for investments in producer organizations while agribusiness SME funds use both equity and debt. Grant funds for Technical Assistance (TA) accompany most agribusiness SME funds and funds for producer organizations. On average, the size of a grant is around 5-7% of that of an investment fund[19].

(c) While many funds are still at the early stage of their investment activities, early evidence shows that agribusiness investment funds can create robust growing companies with significant development return for smallholders, suppliers and local economies. For example, five investments from an agribusiness SME fund in Africa directly impacted nearly 1.4 million smallholder farmers by providing access to markets, inputs and finance[20]. The same group of investee companies also generated an annual IRR of 14% to their investors. The impact assessment concluded that the long term nature of the investment fund helped companies to manage periodic shocks while achieving overall growth[21].

84. Investment Funds in India – Based on a initial overview of this sub sector, the preliminary assesement is:

(a) **The Indian investment fund industry is maturing**. There is a well-established enabling environment as well as a vibrant entrepreneurship ecosystem, especially around major cities such as Chennai, Bangalore, Delhi and Mumbai. The number of PE/VC deals has increased to 1,049 in 2015 from 296 in 2006. During the same period, the total deal value also increased to US$22.9 billion from US$7.4 billion[22].

(b) **Successful fund managers are shifting to larger funds.** A typical PE fund in India with reputable fund managers needs to have at least US$50 million in assets under management to be commercially viable, if there is no form of subsidy. This is partially due to the recent growth of the Indian PE industry providing successful fund managers with opportunities to establish larger funds. For example, two agribusiness fund managers interviewed were currently raising funds for their second funds targeting a total of US$220 million.

(c) **Some SME funds, agribusiness funds, and single state-focus funds were identified.** Four funds focus on agribusiness and five on SMEs. State-focused funds included one that focuses on Maharashtra, one on West-Bengal and one on low-income states. Equity and quasi-equity are the instruments commonly used across these funds. Key metrics of these and other select funds are presented in Annex A-3(a).

(d) **The smaller funds tend to make smaller investments with an average deal size of around USD$1 – 4 million.** Based on their investment strategies and often with a strong emphasis on

[16] FAO. Forthcoming 2017. "Agricultural Investment Funds for Development"
[17] Ibid.
[18] The rest are microfinance investment funds or rural funds.
[19] FAO. Forthcoming 2017. From the analysis of 14 TA grants attached to agribusiness funds.
[20] The Gatsby Charitable Foundation and Pearl Capital Partners. 2012. "Impact investment: Understanding financial and social impact of investments in East African agricultural businesses"
[21] Ibid.
[22] Bain & Company. 2016. "India Private Equity Report 2016"

development impact, these funds target smaller businesses and early-stage entrepreneurs. Whereas, larger funds in agribusiness and impact space tend to target larger deals.

(e) **Return target varies depending on the strategies of the funds.** Some agribusiness and impact funds target commercial return of IRR18-25%. Other funds in the same category pursue sub-commercial return of IRR10-16% with a higher emphasis on development impact.

(f) **Foreign investors play a major role in the funds focused on SMEs and agribusiness**. The above funds are mostly funded by Development Financial Institutions (DFIs) and international private foundations. However, as the industry matures, domestic investors such as commercial banks, pension funds and insurance companies may provide more risk capital to the PEVC funds.

85. Policy & Regulatory Environment

86. The Fund/ Fund manager must be subject to ongoing supervision by a regulatory body and key regulatory regime; and that SEBI (AIF) Regulations, 2012 provides the regulatory regime for PE/VC funds as a separate asset class, and sets out the key parameters of such funds to obtain a certification of registration from SEBI. SEBI notes that Category II AIFs cannot receive any special concession or incentives from the government/ regulator. **Assam Agribusiness Fund (AAF) – A Pre-feasibility Analysis:**

(a) The fund managers and industry experts met generally welcomed the **concept of a government anchored SME agribusiness fund focused on Assam**. They see many features that can potentially be attractive for a fund that focuses on Assam and on agribusiness. However, they also flagged some challenges that can constrain the success of such a fund.

(b) **Advantages for investing in Assam include**:

i) *The substantial production in high value horticulture, fish and meat:* The annual growth rate of production of fruits, spices and vegetables was 19.2, 6.4 and 72.2 percent respectively in the last decade, with Assam contributing significantly to national production in commodities like ginger, banana, pineapple, litchi, etc.

ii) *Proximity to regional and international markets:* Assam is the largest state in the North-Eastern region consisting of 7 states and the most industrially developed among these states. It also relatively close proximity to Bangladesh, Bhutan, Nepal and Myanmar.

iii) *Federal Govt. support for the development of the region:* The Federal Govt. offers a lot of tax incentives in the north-eastern region, has a dedicated central ministry for the development of the region, and has promoted a development finance institution dedicated to the region.[23]

iv) *State Government* initiatives *to improve the investment climate:* The GoA has enacted a new Ease of Doing Business Act that envisages setting up a Single Window Agency / Assam Investment Promotion Board (AIPB) to reduce the cost and speed up the process and time enterprises need to obtain clearances. The expectation is that this act will help improve Assam's ranking in ease of doing business as compared to other states with which it is competing for investments. In the sub-national Doing Business rankings done in 2009, Guwahati had an overall ranking of 8 among 17 cities.[24]

[23] http://mdoner.gov.in/ and www.nedfi.com
[24] http://www.doingbusiness.org/data/exploreeconomies/india/sub/guwahati

v) *Less competition investment space:* Only two PE/VC funds are reported to have invested in agribusiness in Assam, and in the region in general, till date. And both of these funds have invested in the same company.[25]

(c) **The key challenges include**:

i) *Infrastructure challenges:* Key challenges include inadequate power supply and limited availability of land that can be used for industrial purposes.

ii) *Underdeveloped agribusiness value chains, food processing sector:* There is low investment in assets and limited technology penetration across the food processing sector in the state, even though this sector contributes about 22 percent of the industrial output and represents 26 percent of gross value add of the state. The food processing sector is largely unorganized and operates on a small scale, with a few exceptions. Most SMEs are family-owned entities with limited growth ambitions.

iii) *Perceptions of insecurity:* Assam and the region have a history of political conflicts, which in the past have led to significant insecurity. Although, this is not an issue any more in Assam, there is a potential that perceptions of insecurity remains and thereby limits the inflow of private capital and skills.

iv) *Isolation from the main PE/VC eco-system in major cities:* The major centers of the PE/VC ecosystem in India are Mumbai, Delhi, and Bangalore, all significantly far from Guwahati, Assam's capital city. This may limit the pool of fund managers interested in competing to manage AAIF.

87. Objectives of the Sub-Component:

(a) Providing risk capital (equity/quasi-equity) for high growth Agribusiness SMEs in Assam

(b) Unlock the agricultural potential of Assam to focus on risk capital to agribusiness SMEs.

88. AIF Preliminary Design:

(a) The abovementioned objectives will be accomplished either by sponsoring a new Fund[26] or contributing capital to a similar Fund already in existence.

(b) Key features of the Fund, in both cases, are expected to be:

i) a fund-size of $15- $25million:

ii) investment deals of $100,000 - $2 million;

iii) managed by a competitively selected Fund Manager;

iv) no government participation on the investment committee;

v) 10 years in Fund life extendable to 12 or 15 years (since agribusiness sector requires longer gestation periods);

vi) allow investments in SMEs in agribusiness, including sub sectors like agri warehousing/logistics etc

vii) provide pre- and post-investment technical assistance to SMEs to relieve capacity constraints;

viii) denominated in Indian currency to eliminate currency risk, particularly for non-export oriented SMEs

[25] Investment in Arohan, a pork processor in Assam invested by Omnivore and ICCo Investments .Additional investments were reported to have been made in the information technology sector but could not be confirmed.

[26] Under Securities and Exchange Board of India's 2012 Alternative Investment Fund (AIF) regulations.

ix) Adherance to WBG Policies & requirements (eg: Performance Standards, Restrictions on Category A Investments, E&S Safegaurds, Exclusion List, Intigrity & Anti-Corruptions Provisions, Off-Shore Financial Center Policy)

x) Fund will seek additional capital from commercial LPs

(c) Fund Managers that could potentially bid to manage the fund include three categories:

(i) agribusiness fund managers currently managing pan India agribusiness funds

(ii) new fund managers, with individual or team track records, seeking to build a fund level track record

(iii) social enterprise/ impact fund managers

(d) Potential co-investors in the fund include the following categories:

(i) public sector investors such as NABARD, LIC, SIDBI

(ii) corporates interested in the agribusiness space in Assam such as ITC

(iii) impact investors currently interested in the North East/ Agribusiness

(iv) Private investors (eg. Pension funds, insurance companies) may also co-invest with the SME Fund at the deal level

(v) Other potential players with an inclination towards APART commodity value chains

(e) Given the restrictions imposed on the investment strategy (agribusiness SMEs in Assam), the Fund is likely to require both financial and non-financial incentives in order to attract private participation, which is important for the Fund's success and suitable provisions would be kept for such incentives.

(f) The EOI/RFP process to select a Fund Manager would seek to solicit the best investment strategies, while aligning with the strategic objective to invest risk capital in agribusiness SMEs with locus of activity in Assam. Standardized parameters would allow cross comparison between proposals. These include the track record the fund manager; their ability to mobilize additional capital; proposed fee structure parameters such as management fees, hurdle rate, and carry (share in profits by the fund manager) etc.

(g) Given a single state, agribusiness SME fund is generally considered higher risk initiative, the following risks are recognized: i) a suitable Fund Manager may not bid; and ii) the Fund may not find sufficient pipeline. In such cases, the project would need to reallocating loan funds allocated to this component.

89. Eligibility & Selection Criteria

(a) **For Fund Manager**

i) Both established and new fund managers would be encouraged to apply

ii) Not only fund managers in agri and allied domains, but also those in the social and impact investing space will be encouraged to apply

(b) The criteria for investee company would be decided in line with the strategic objective of the Govt;

90. Activities to be covered under the sub-component

(a) Finalization of the Department in the Govt. of Assam to be limited partner in the fund has been done with due diligence by assessing the strength and capacity of potential Departments to responsibly handle and manage limited part of the fund. Industries & Commerce Department will be the Limited Partner from GoA and Commissioner, Industries and Commerce will be the representing officer.

(b) A feasibility study of the fund would be carried out addressing the two main components: 1) demand-side mapping of agribusiness SMEs with risk capital needs, with the aim to identify a potential pipeline for the Fund; 2) supply side assessment of the overall environment for risk capital financing, including bank financing, subsidies, and private equity/venture capital investments. This study would also propose a template for the fund design and structure, which would form a reference for the EOI/RFP process.

(c) Hiring the services of a local counsel specialized on investment funds, with qualifications and experience, and under terms of reference, agreed with the Bank, to provide advice to Assam in the preparation/review of the AIF Operational Manual of the AIF and legal documents involving the establishment of the AIF or the contribution to an existing fund meeting all of the requirements of the AIF Operational Manual;

(d) Putting together an RFP package for selection of the General Partners or Fund Manager: This will be done following World Bank procurement procedure through international competitive bidding.

91. Illustrative Lists of Tasks to be performed by Fund Manager

(a) Scouting and selection the investee companies: This will be done by the Fund Manager. The fund will be publicized widely so that larger number of potential investee companies are reached out.

(b) Making Actual Investments in the Investee Companies: The investments will be made as per business detailed plans received and vetted by the Fund Managers in tranches as deemed feasible by the Investment Committee.

(c) Providing Technical Assistance to investee companies: The Fund Manager will provide the required technical assistance to the investee companies through his own resources or outsourced.

92. Illustrative List of investments (Rs in Lakhs):

Item of Expenditure	2017	2018	2019	2020	2021	2022	2023	Total
A. Feasibility study, support RFP preparation & other studies	200.00	-	-	-	-	-	100.00	300.00
B. Capital contribution to agribusiness fund / company	-	-	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	10,000.00
C. Technical Assistance	1,000.00	-	-	-	-	-	-	1,000.00
D. Fund Management Fee*	-	-	300.00	300.00	300.00	300.00	300.00	1,500.00
Total	1,200.00	-	2,300.00	2,300.00	2,300.00	2,300.00	2,400.00	12,800.00

* approx 3% of fund value

Note: since the project is for seven years, seven year estimates have been shown here. However, the fund life is 10 years extendable to 12-15 years.After the project, GoA would make necessary provisions to keep the Fund activities going.

93. Key Output Indicators and Intermediate Level Indicators

(a) **Results Chain**

Activities	Sub Activities	Output	Outcome
Setting up the Assam Agribusiness SME fund	Select fund manager	Agribusiness SME fund launched and closed	No. of agribusiness SMEs produced positive financial and development return
	Design the details of the fund		
	Raise additional investment and close the fund		
Promotion of the fund	Conduct promotion activities of the fund in Assam and other cities	Agribusiness SME fund recognized among entrepreneurs, investors and other stakeholders	

(b) **Results Framework**

Indicator name	Cumulative values							
	Baseline	Y-1	Y-2	Y-3	Y-4	Y-5	Y-6	EOP
Total number of firms invested by the Agribusiness SME Fund	0	1	3	5	7	9	11	11
Investment made and leveraged by the agri business Fund (amount in USD M)	0			5	10	15	20	30
Capital contribution to agribusiness fund / company (USD million) from the project	-	-	-	3	6	9	12	15

94. Implementation Arrangements (Preliminary): The key elements of the implementation arrangements include legal agreements between the World Bank, GoA, and the Fund; the administration/management agreements between the GoA and the Fund Manager; the financial management arrangement that will guide the funds flow and fiduciary safeguards for the Project funds to be used as GoA contribution to the Fund; and lastly, the environmental and social safeguard arrangements. Subject to confirmation by World Bank's legal, financial management and safeguards specialists, the key elements of the implementation arrangements are expected to be as follows:

(a) ***Subsidiary Agreement and Project Agreement*** *:*

i) Assam Rural Infrastructure and Agricultural Services (ARIAS) Society will sign a subsidiary agreement with Commissionerate of Industries and Commerce, Government of Assam that is designated as the LP for the Agribusiness SME fund. The Subsidiary Agreement will set forth all the terms and conditions under which the Government of Assam is making the funds available to Fund Manager.

ii) A Project Agreement between the World Bank and ARIAS Society will be signed, setting forth the details of Society's obligations to the World Bank as the Project Coordination Unit (PCU), and references to governance, procurement, reporting and safeguard rules. It will also refer to the Project Implementation Plan (PIP) which includes the detailed eligibility criteria, project implementation and management guidance.

(b) ***Administration and Management Agreement, and Fund Operations Manual:***

i) The Sub Component of the Assam Agribusiness Fund will be under the implementation responsibility of Commissionerate of Industries & Commerce, while the selected fund management company will be responsible for managing the Agribusiness SME Fund itself, in accordance with the guidance and the final version of the Fund Operations Manual to be prepared by Commisionerate of Industries and Commerce in consultation with PCU, ARIAS Society.

ii) Once the winning bid for the Agribusiness SME Fund Manager tender process has been awarded, Commissioner of Industries and Commerce will sign an Administration Agreement with the selected Fund management company, to ensure the Fund management company complies with the Project Operations Manual as well as AIF Operational Manual.. Fund itself would be governed by standard investment documents, such as a Limited Partnership agreement, Subscription Agreement, Management agreement, Prospectus, or Side Letter, which will define the terms and conditions of the Government's investment

iii) The GoA will have broad oversight of the Project and will receive full reporting from World Bank regarding project activities on a semi-annual basis.

iv) Financial management implementation arrangements will be defined in detail in the Fund Operations Manual. The Limited Partner will report to the World Bank through PCU, ARIAS Society as indicated in the financial management section of the PIP.

95. Sustainability

(a) The rising appetite for such companies among overseas investors and also the higher prices being enjoyed by agri commodities in recent years could continue to sustain Private Equity interest in the industry.

(b) Assam/Guwahati being Center of the North East, a feeder market to other NE states and a pick up point of high value raw materials from these states to the mainland will help in sustaining the initiative.

(c) Entry to newer markets through opening up of Asian Highway-1 (AH-1) like Bangladesh, Thailand and other South East Asian countries will ensure sustainability of the operations of the investee companies.

96. Risk and Mitigation Measures: following risks to the feasibility / success of AAIF have been identified and mitigation strategies proposed.

Potential risks	Mitigation strategies
SMEs typically need risk capital beyond the average life of a PEVC fund	• Extended fund life (10+ years) • Flexibility in investment strategy (sector target, ticket size and investment instruments)
Difficulties in attracting fund manager with successful track record	• Market intelligence and strategy to reach out to relevant fund managers • Involving selected manager in designing the fund structure • Subsidy to cover some fund management costs, such as start up costs
Limited pipeline	• Feasibility study that will include analyzing the potential pipeline • Collaboration with the Enterprise Development and Promotion Facility (EDPF) (Project component A) and other ongoing initiatives in the state • Pre investment technical assistance support for the investees
Limited exit options	• Strong linkages with the eco-system through fund manager and investors (LPs) • Marketing of the fund and investees in the Indian PEVC industry through Project Technical Assistance • Post investment technical assistance value-adding support for investees which would make it easier to exit

Sub-Component A.4: Establishing stewardship councils

97. About the Component: The project would support setting up of sector stewardship councils for engaging industry leaders and relevant value-chain stakeholders to act in concert to develop and implement sustainable strategies to improve the competitive position of their respective industries and institute a sustainable mechanism for effective public-private sector dialogue. They would be involved in identifying constraints (policy or otherwise) and workforce development, skill gaps that needed to be addressed to raise productivity and competitiveness of the sector. The project would support, among others, (i) preparation of detailed action plans, feasibility studies, etc.; (ii) provide technical assistance to undertake long term planning for these groups; and (iii) provide need based investment support on the basis of business plans prepared by them.

98. Objective: The broad objective of this sub-component is to strengthen information, coordination and linkages in the targeted value chains and institute a sustainable mechanism for effective public-private sector dialogue bringing together stakeholders in the pork, fish, perishables and spices & condiments value chain on a common platform. Specifically, this sub-component will have the following objectives:

(a) Defining a long term vision for the particular sectors and working towards it involving all important stakeholders

(b) Identification of performance/efficiency gaps in the value chains and devising strategies for the sector to plug these gaps

(c) Linking all the stakeholders of Agriculture Value Chains

(d) Policy communication for effective growth of the sectors/value chains

(e) Dissemination of findings/activities through events and publications to the public at large

99. Policy and Regulatory Environment: At present, there is no policy on sector stewardship councils in India. However, sector skill councils do exist in India. An example is Agriculture Skill Council of India (ASCI). They come under the Ministry of Skill Development & Entrepreneurship. Sector Skill Councils are set up as autonomous industry-led bodies by NSDC. They create Occupational Standards and Qualification bodies, develop competency framework, conduct Train the Trainer Programs, conduct skill gap studies and Assess and Certify trainees on the curriculum aligned to National Occupational Standards developed by them. At present there are a total of 38 sector skill councils in India. There is no exclusive agribusiness sector skill council.

100. Eligibility and Selection Criteria: Initially four value chains have been prioritized for the purpose of sector stewardship councils. These are pork, fish, perishables and spices & condiments. The basis of prioritization is high growth potential, quantum of production & trade and relative importance to the state.

101. Activities to be covered under the sub-component include:

(a) **Engagement of a technical assistance service provider:** A technical assistance service provider will be hired from the market to envisage a structure of the stewardship council including its governance and institutional mechanism. In addition the service provider will

(i) mobilize the stakeholders across four value chains (pork, fish, perishables and spices & condiments) based on interventions in components A, B & C of the project, on a common platform

(ii) help them prepare a long term vision and planning for their particular value chain (vision document)

(iii) preparation of business plans

(b) **Identification of policy and regulatory level constraints in the sector**: This would be accomplished by setting up policy dialogue group as a think-tank through mobilization of important stakeholders in the prioritized value chains, to track relevant regulatory measures. This policy dialogue group (7-10 members) will be engaging with government, private agribusiness (including trading) sector and other relevant stakeholders to track regulatory measures and suggest to the Government desirable changes for developing an effective agribusiness ecosystem in the state. In consultation with private sector stakeholders, it will capture maximum potential of the Government's development strategies, policy and regulatory framework, and their conduciveness to agribusiness. Further, it will identify and recommend opportunities in the legal and policy framework to improve the enabling environment for agribusiness.

(c) **Preparation of Detailed Action Plans and Feasibility Studies**: This would be accomplished with the active support of industry associations like Federation of Indian Chambers of Commerce and Industry (FICCI) and Confederation of Indian Industry (CII) at national level and organizations like Assam Chambers of Commerce at state level. These feasibility studies and action plans will be useful resources to the sector stakeholders.

(d) **Events and Publications:** The sector stewardship council will hold regular events for wider dissemination of its activities. The events will comprise of annual meetings, sectoral planning meetings, policy communication seminars etc. The council will also bring out publications like sectoral reports on each of the focus sub-sector, sector wise policy briefs, annual report of the council, quarterly newsletter etc.

102. Budget (Rs. Lakhs): The following is the budget estimate for this component of the project

S..	Item of Expenditure	2017	2018	2019	2020	2021	2022	2023	Total
1	Establishment and setting up	16							**16**
2	Policy dialogue group-formation & mgt	15	12	12	12	12	12	12	**87**
3	Organization structuring	5	4	3					**12**
4	Consultancy Services of a Technical Assistance Provider	48	16	8	8	8	8	8	**104**
5	Support for implementation of B-plans			1000	1000	1000	1000	1000	**5,000**
6	Events	1	6	6	6	6	6	6	**37**
7	Publications	1	12	12	12	12	12	12	**73**
	Total	**86**	**50**	**241**	**238**	**238**	**238**	**238**	**5329**

103. Sustainability: The Sector Stewardship Council will charge for its services. For example, participation in some of the events by general public may be charged. Similarly, some of the publications will be priced. The accumulated amount will be maintained as reserve/corpus fund and invested in Government securities till the project period. After APART support ceases, this amount will be used to run the Sector Stewardship Council which will ensure sustainability of the council.

Component B: Facilitate Agro Cluster Development:

104. Component B: Facilitate Agro Cluster Development: The objective of this component is to establish a modern supply chain from farm to market that will enable farmers and other value chain participants to access new markets. The component will use a geographically targeted approach by focusing interventions on clusters of agri-enterprises so as to enable an increase both in the number of such enterprises and in their scale of operations. Interventions under this component will include mobilizing agri-enterprises and building their capacity to undertake joint actions; enhancing access to a range of Business Development Services (BDSs), including linkages to growth financing; and developing needed infrastructure at the local level, including development of common facility centers, up-gradation and modernization of agri-markets, warehouses, and rural access roads liked to these supply chains.

Sub-Component B.1: Support establishment of cluster level Industry Associations

105. Sub-component Objective: The objective of this sub-component is to enhance competitiveness of agri-enterprises in specific geographic locations. This subcomponent will seek to impact approximately 2,000 enterprises across about 20 geographic clusters by mobilizing them into Industries Associations (IAs) at the cluster level; strengthening the capacity of such IAs to develop an Agro Industrial Development Plans (AIDPs) laying out an action plan for addressing cluster level obstacles to enterprise growth over the project period; and enhancing access of agri-enterprises to needed technical and Business Development Services (BDSs). The subcomponent will provide partial financing for AIDPs, with partial financing coming in the form of user fees and contributions made by agri-enterprises. The types of local gaps and resulting interventions and services required - as captured in the AIDPs - may vary by local context, but is expected to include enhancing availability of a skilled labor pool through skills training initiatives; increasing efficiencies and reducing business costs through developing and sharing of business functions such as research and development, information networks, common infrastructure, and joint marketing and branding efforts; and increasing efficiencies through linkages to specialized technical and BDS services such as assistance with developing business plans, introduction of improved technologies, fostering linkages to input suppliers and linkages to debt and investment financing.

106. Policy and Regulatory Environment

(a) Micro and Small Enterprise – Cluster Development Program (MSE-CDP): The Ministry of Micro, Small and Medium Enterprises (MSME), Government of India has adopted a cluster development approach as a key strategy for enhancing the strategy and competitiveness as well as capacity building of micro and small enterprises (MSE) and their collectives in the country. This clustering initiative of Government also enables service providers like banks, other credit agencies, transporters, warehouses etc to provide their services economically, thus reducing costs and increasing availability of services to enterprises in the clusters. Modest assistance is given for diagnostic study, soft interventions, hard interventions (setting of Common Facility Centres) and infrastructure development.

(b) The project would adhere within the framework of the State's Sustainable Development Goals, Vision 2020 and also would promote its activities as per the policies under the State Industrial Policy, 2014 and MSME Act 2006.

(c) In a nutshell, a successful policy intervention on clusters should remove entry/exit barriers for enterprises related to cluster, remove regulatory burdens that prevent firms from functioning efficiently, develop institutions that cater to collective R&D need of firms in the cluster, develop institutions that offer specialized skills for competitiveness, one stop shop for dissemination of public

information on products and markets, facilitate export promotion and FDI attraction, develop basic provisions for land, labour, capital as well as advance factors such as skilled labor, technology and equipment, faster/cheaper transportation etc.

(d) **Procurement Preferential Policy 2015**: This policy was announced in 2015 to facilitate growth of micro, small and medium enterprises, to provide opportunities to local entrepreneurial talents and to maximise avenues for employment generation. Increased participation of MSMEs in the state government purchase program, enhancement of competitiveness among micro and small enterprises, encouraging linkages between micro and small enterprises & large enterprises, increased share of supplies of MSME to state government departments and aided institutions and PSEs, development of MSEs vendor in rural areas and enhancing participations of Micro and Small Enterprises including those owned by Scheduled Castes or Schedule Tribes and Women.

(e) **Ease of doing business Act 2016**: The Assam Ease of Doing Business Act, 2016 is an act to provide for speedy processing of applications and issue of various clearances required to be issued by various competent authorities of the State Government of Assam under various state enactments for setting up industrial or service sector undertakings for the promotion of industrial development of the state and for an investment friendly environment in the state of Assam and for matters connected herewith or incidental thereto.

107. Component Objectives

(a) To increase competitiveness, revenue generation and employment growth of MSME agro enterprise clusters through an enabling environment that promotes economies of scale and scope.

(b) Economies of scale benefit includes : Access to skilled labor pool; sharing of common service centers around functions such as research and development, information networks, marketing and branding efforts; and sharing of common infrastructure for ex: Effluent Treatment Plants, and warehousing facilities.

(c) Economies of scope benefit includes: Sharing of business functions and costs, such as cooperation between firms in marketing; cross-selling related products; and the outputs of one business being used as the inputs into another.

108. Pre Feasibility Analysis :

(a) The project has undertaken a data collection exercise in project districts from both primary and secondary sources, and identified existing production and enterprise clusters (both registered and unregistered). The project has also conducted initial analysis to identify the sub-sectoral breakup of these clusters and has hired a firm to map these firms geo-spatially on a map so as to identify focused geographic clusters for project intervention. During the period of the exercise, almost 150 nos. of Enterprise Clusters have been identified, and out of these 17 no. of Industries' Associations shall be formed, keeping in consideration of similar activities, challenges and opportunities. These 17 IAs shall be spread across four operational zones, framed for the purpose of APART implementation. The details of the APART operational zones are as follows:

APART ZONES	District	TOTAL	CLUSTERS
ZONE 1	SONITPUR	378	4
	DARRANG	124	
	LAKHIMPUR	61	
ZONE 2	SIVASAGAR	345	5
	GOLAGHAT	259	
	KARBI-ANGLONG	24	
	JORHAT	174	

APART ZONES	District	TOTAL	CLUSTERS
	CACHAR	10	
ZONE 3	NAGAON	258	6
	MARIGAON	190	
	KAMRUP	234	
	GOALPARA	179	
ZONE 4	NALBARI	141	2
	DHUBRI	82	
	BARPETA	63	
	KOKRAJHAR	13	
Total Prioritized Industries 2535, Total IA - 17		2535	17

(b) ***Strategy Statement****:* The main intervention strategies envisioned as part of the cluster development plan have been classified into three broad areas that seek to leverage collective efficiencies of groups of clusters in a concentrated geographic area:

i) Promote institutions/organizations at the cluster level that enable joint action by cluster actors to take advantage of collective efficiencies

ii) Strengthen planning functions at the cluster level to identify and develop a "competitiveness enhancement" plan

iii) Enhance implementation capacity to deliver needed services and infrastructure needed at the cluster level to enhance firm-level competitiveness.

109. Key output Indicators and Intermediate Level Indicators

(a) **Results Chain**

Activities	Sub Activities	Output	Outcome
Identification and Mobilization	Establishment of state and district level (DLCC) enterprise cluster management committee:	Streamlining the *Structure* and *Implementation Arrangements* for Industry Associations (IAs)	Growth barriers to business overcome by members of agro enterprise clusters through collective action
	i) State Level : Hiring of Cluster Development Technical Agency (SCDTA)		
	ii) Cluster Level : Hiring of Cluster Facilitation Team (CFT)		
	iii) Formation/registration of Industry Associations (IAs)		
Diagnosis, Planning and Preparing District Agro Industrial Cluster Development Plan (DAICDP)	Training of CFTs on facilitating DAICDPs		
	Development of DAICDP discussion checklist	District Agro Industrial Cluster Development Plan developed for clusters	
	Development of an DAICDP template		
	Convening Stakeholders		
	Development of Draft DAICDP		
	DAICDP Review Workshops		
	DAICDP approved by CDAs and endorsed by State Cluster Team		
Service Delivery at Cluster Level	Identifying resource organizations for delivery of needed services	Commercial growth of the enterprise clusters	
	Developing/adopting existing tool kits for delivery of specific services across clusters		
	Training to CFT on service delivery and monitoring		

(b) **Results Framework**

		Cumulative figures						
Indicator	**Base**	**Y-1**	**Y-2**	**Y-3**	**Y-4**	**Y-5**	**Y-6**	**Y-7**
Joint actions undertaken by firms in a cluster (Average Number)	0	0	28	96	164	232	300	300
No. of Agro Industrial Development Plans (AIDPs) developed	0	0	7	17	17	17	17	17
Number of firms mobilized into Industry Associations (IAs)	0		700	1700	1700	1700	1700	1700

110. Eligibility and Selection Criteria

(a) *Size of geographic cluster*: It is proposed to look at block-level or below to enable focused convergence of investments and activities. In selected the boundaries of geographic clusters, it is also proposed to stay within existing district administrative boundaries and follow boundaries of sub-administrative units corresponding to planning sub-units, including blocks and Gram Panchayats to enable effective planning and convergence of government investments in infrastructure and services.

(b) Operationally, following the strategy of evaluating the lowest administrative unit for which differentiated data is available and then evaluating contiguous areas until arriving at cluster boundaries. [With a cap on total size of cluster no more than 10 kms. The cap is for location of project expenditure purposed only. Access to services at cluster level may be made available to firms that are able to meet access criteria across the district]

(c) Method of identification and selection of Geographic Cluster: It is proposed to use a minimum set of criteria focusing on factor availability and a relative ranking set of criteria focusing on density of economic activity to identify the best locations within project districts.

111. Activities to be covered under the sub-component

(a) **Identification and Mobilization**: The first stage in the cluster development process is identifying and mobilizing local agro-enterprises into an Industries Associations. The Industries Association (IA) will be a registered body that undertakes joint actions and cost sharing for specific purposes such as, for example, trade-fair participation and creation of Common Facility Centres. A Cluster Development Technical Agency shall be hired for identification of potential Industries Association, formation & registration of the same out of the identified existing clusters. The project will also set up a District Level Coordination Committee (DLCC) at the District level to monitor and oversee activities and expenditures of the IA on a quarterly basis. The DLCC will review activities and expenditures of the IA against the DAIDP (District Agro Industrial Dev. Plan)[27] and certify that IA activities and expenditures are as per the approved AIDP. The Implementation Arrangement for the DAICDP is proposed as follows:

Implementation Arrangement for DAIDP							
#	**Implementation Arrangement**	**Units**	**Delegation**	**Head/ Personnel**	**Engagement Model**	**Payment Module (Rs in L)**	**DAICDP**
A	State Cluster Dev Committee	1	Level 1 : State Level Advisory Team	Commissioner of Industries and Commerce	GOA	Nil	DAICDP Theoretical Framework based on the trial studies conducted by IIE with the help of Cluster Dev Specialist placed by ARIASS PCU
B	DLCC	16	Level 2 : District Level Advisory Team	Deputy Commissioner	GOA	Nil	
C	Cluster Development Technical Agency (CDTA)	1	Level 3: Hired Professional Consultants (State Level)	Hired	Hired by CI&C	680	Detail work plan to be developed customized for each Zone

[27] DAIDP – District Agro Industrial Development Plan, is an investment plan for Enterprise Clusters, prepared by IA in

Implementation Arrangement for DAIDP							
#	Implementation Arrangement	Units	Delegation	Head/ Personnel	Engagement Model	Payment Module (Rs in L)	DAICDP
D	Cluster Facilitation Team (CFT)	4	Level 4: Hired Professional Implementers at Zonal Level @ 4 Zones	Hired	Placed through CDTA		Implementation of DAICDP through Cluster Industries Associations
D1	Cluster Facilitation Agent (1)	4				269	Beneficiary Contribution shall be accounted from the Industry Associations with an incremental ratio from 10%(Y2) to 60%(Y7)
D2	Cluster Facilitation Coordinators (2)	8				235	
E	Cluster Industries Association	17	Level 5: IA Level	Selected people from within the IA	Formed by CFT		
E1	Accountant (17)	17				250	
E2	Coordinator (17)	17				179	

This will be accomplished through the following sub activities:

i) State Cluster Dev Committee (SCDC): To be structured at the State HQ level and steered by the CI&C. The basic purpose shall be for review and approval of DAICDP.

ii) DLCC : To be structured at the District HQ level and steered by the DC. The basic purpose shall be for supporting the DAICDP review and approval procedure by the SCDC.

iii) Cluster Development Technical Agency (CDTA): CDTA shall be hired for identification of potential Industries Association, formation & registration of the same out of the identified existing clusters. CDTA will facilitate the preparation of the DAIDP for each of the selected districts. They will also be responsible for preparing the road maps for conducting exposure visit, workshops, skill development, promoting product development and branding, ICT Campaign as a part of capacity building and providing necessary aftercare support to the IA for the project period as per the provisions of AIDP. They will also act as a Liaoning agency between state and district level cluster team and implementation agency. CDTA shall arrange for training of State Team and CFTs; and ongoing handholding and review of DAICDP; manage Cluster Development Teams; development of quality AIDPs; information collection and dissemination of best practices across AIDPs; and coordination at state level with technical service agencies and Line Departments for delivery of services.

iv) Cluster Facilitation Team (CFT): CFT under the CDTA will be involved in the mobilization of cluster enterprises and actual implementation of the customized DAIDP as per the detailed guidelines received from CDTA.

- Cluster Facilitation Agent (CFA) : The main person responsible for conducting diagnostic studies, sensitization workshops among the enterprise clusters to create a cohesive atmosphere and fill-up the critical gap, mobilization of cluster development actors and development of AIDP
- Cluster Facilitation Coordinators (CFC) : Responsible for assisting the CFA in mobilization and development of AIDP and coordinating service delivery through interfacing with the identified technical service providers and coordinating convergence at the local level with line departments.

v) Industries Association (IA): IA will act as service providers during the mobilization and activation of industries association with technical guidance from the CFT.. The activities of IA shall be reviewed by DLCC once in a month and report it to State cluster development team. Following staff will be hired by IA to assist their functioning

- IA Accountant (IAA): Responsible for financial documentation and traceability
- IA Field Coordinator (IAFC) : Responsible for achieving all operational targets, documentation and MI communication

(b) **Diagnosis, Planning and Collaborative Strategy (codified into a Agro-Industrial Development Plan):** The second stage in the cluster development process is diagnosing gaps, identifying potential opportunity areas for joint action towards greater competitive of firms in the cluster an developing a Cluster Intervention Plan, termed the Agro-Industrial development Plan in the APART project. Development of the AIDP is a critical step in the process and capacity needs to be built to facilitate a demand-based, consultative process married with technical guidance on specific aspects to ensure that (a) actual local concerns and gaps are accurately reflected in the plan (b) cluster stakeholders are exposed to best practices and information on technical feasibility of selected activities while developing a plan for collaborative action and (c) the Cluster Development Association takes ownership of the AIDP developed. This will be accomplished through the following sub-activities-

i) **Training for CFTs** on facilitating AIDPs.

ii) **Development of AIDP discussion checklist** based on IIE study for CFA to flag and steer discussion on particular sets of issues. Tendency is to always ask for public financing for everything, but CFA needs to facilitate discussion and collaborative strategies and joint actions amongst cluster actors.

iii) **Development of an AIDP template** giving a broad structure for the document.

iv) **Convening stakeholders** – both demand-side stakeholders (companies in each cluster) and supply-side stakeholders (public and private supporting economic institutions) - in working groups to identify priority challenges and action initiatives to address problems at cluster level.

v) **Development of Draft AIDP document:** It will be an investment planning documents for the identified clusters in District. It will be prepared district wise.

vi) **AIDP Review workshops** to review AIDPs at state level – with assistance from technical agency - and feedback to improve the AIDPS given. Best practices from AIDPs identified and information given to CFTS and CDAs.

vii) **AIDP finalized and approved by CDAs; and endorsed by State cluster Team.**

viii) Cluster Dev Technical Agency shall be responsible for preparing the Assam Agro-Industrial Dev plan and guide the Cluster Facilitation Agent to implement the same.

(c) **Service Delivery at Cluster Level:** The final stage is ensuring delivery of needed services identified in the AIDP through developing local capacity for delivery of needed services and monitoring delivery of such services. Typically, the following sets of services are delivered to enhance firm competitiveness through a cluster strategy:

i) Business Development/Consulting Services for supporting enterprise growth in the cluster.

ii) New technology adoption (and dissemination through “automatic” replication at the cluster level.)

iii) Skill development leading to availability of specialized labor force for selected industrial sectors.

iv) Intermediation for enhancing access to appropriate machinery and input suppliers through joint purchasing, support for opening local distribution windows.

v) Promoting intermediate businesses needed in different parts of the value chain. For example, establishing cold storage capacity where perishable products are being promoted.

vi) Joint marketing and branding efforts.

vii) Development of common facility infrastructure such as markets, warehousing and cold storage capacity and road networks.

This activity will encompass following sub activities-

- **Identifying source organizations** for delivery of needed services: The project will identify source organizations for generation of technical services listed above. The AAI, promoted through the project, will anchor the generation of improved technology and Business Development Services for firms at the cluster level. DICCs will be responsible for Ease of Doing Business services including registration, access to Industry Department land banks and industrial sheds, and convergence with government schemes. Intermediation services, to improved inputs and machinery can be leveraged through the Sector Management Councils being promoted through the project. Joint actions such as marketing and branding efforts and common facility centers will be promoted by the CDT.
- **Developing / adopting existing toolkits for standardized delivery of specific services across clusters:** State Cluster Development teams will collate information across AIDPs to identify common sets of services needed and link to technical agencies required to provide those services, and work with those agencies to develop (or adapt existing) standardized toolkits, where feasible, for delivery of such services. For example, toolkits for business plan development, entrepreneurship training, and common BDS such as production forecasting and inventory management may be developed if the need is flagged in AIDPs.
- **Training of CFT on service delivery and monitoring**: CFT members need to be trained, through training conducted by the respective service delivery technical bodies and through exposure visits, to understand the nature of services to be delivered. The CFT team will be responsible for playing an intermediation role between cluster firms and the service delivery agencies through mobilizing firms to access needed services, monitoring minimum quality levels of services being provided and organizing local logistics as needed.
- **Training of the IAs** on Business Edge or other similar tools shall be conducted from Y2 onwards. Approximately 25% of the trainings shall be conducted in Y2, 50% in Y3 and the remaining shall be conducted in Y4. 75% of the training cost shall be borne by APART and 25% shall be in the form of beneficiary contribution. Approximate total cost of training per participant shall be $400 USD. These trainings shall be managed by CDTA.

112. Estimated cost: The total estimated cost for this component will be around Rs.106 crores, including contribution of about Rs.14 crore by IAs. Indicative breakup of the cost is as given below. Details are provided in the cost tables.

SL	COST HEAD	COST (Rs in L)	PERIOD OF ENGAGEMENT (Years)
A	Establishment of Enterprise Clusters	1862	7
B	Support to Industry Associations	2528	7
C	Capacity Building & Training	901	7
D	Skill development	46	7
E	Branding & Product Development	644	7
F	Development of Common Facility	4600	7
	Total	10581	

113. Release of project grant for creation of common assets (Common Facility Centres): After the b-plans are reviewed by EDPF and approved by PIU and PCU for creation for Common Facility Centre by IAs, an agreement for release of project grant will be signed with the IA. The generic template of MoA is provided in *Annex B1(a).* After signing of grant agreement by both parties, the first tranch of grant amount will be released and deposited in the separate account opened by IA in any scheduled bank for the purpse. The second tranch will be released only after submission of Statement of Expenditure (SoE) and Utilization Certificate (UC).

114. Institutional and Implementation Arrangements

(a) This component will be anchored by Department of Industries and Commerce through their District Industries and Commerce Centres (DICCs) located at each project District HQ.

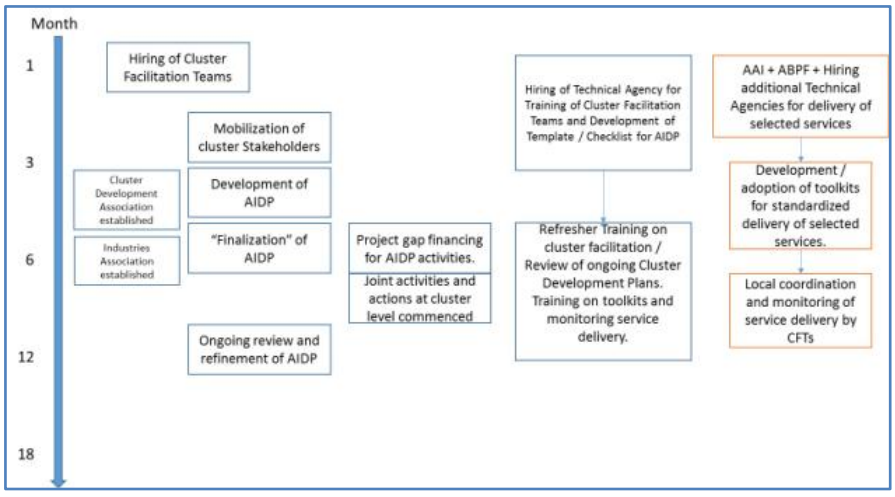
(b) **State Cluster Team (SCT):** A state level cluster team would be formed to be based in the Department of Industries and Commerce at Guwahati. The team will liaise with individual cluster authorities and will manage Cluster Development Teams; development of quality AIDPs; information collection and dissemination of best practices across AIDPs; and coordination at state level with technical service agencies and Line Departments for delivery of services.

(c) State Cluster Management Committee. The state cluster committee would be constituted by the Department of Industries and would include the following members:

- Commissioner of Industries of Commerce, Assam - Chairman.
- Director of MSME, Bamunimaidam, Guwahati-21 - Member
- Director of IIE, Lalmati, Guwahati - Member
- Additional Director of Industries and Commerce(DIC) - Member secretary

(d) District Industries and Commerce Centres (DICCs) will be reporting the progress of cluster development initiatives in their respective districts to the District Level Coordination Committee (DLCC). The cluster facilitation teams would also report to the DLCC.

115. Implementation Timelines



Sub-Component B.2: Supply chain support

116. **Supply chain support**: The objective of this sub component is to establish a modern supply chain, which prevents wastage and value erosion, and allows farmers and agro- entrepreneurs to access to more distant markets within a reasonable time. The activities to be financed include: (i) improving rural access roads that are connected to the clusters; (ii) modernizing and upgrading the warehouses, including issuing of warehouse receipts; (iii) upgrading and modernizing of regulated wholesale markets, and (iv) introduction of e-marketing platforms. As a design principle, this sub component will support climate resilient and environmentally optimized road, market and warehouse design using alternative materials (e.g. local sand deposits accumulated due to floods, fly-ash etc), brining both environmental and economic benefits, improved drainage measures in flood affected areas, and use of bio-engineering measures for erosion control that provides for green cover and also serves as carbon sinks.

Sub-Component B.2.1: Rehabilitation of access roads

117. **Rehabilitation of access road**: **Over view of the subcomponent**: The focus of this activity would be on upgrading the rural access road that are connected to the enterprise and production clusters, thereby providing connectivity and market access to the project beneficiaries. As part of the project preparation activities, about 550 km of rural access road has been identified. The investments in these roads would be complemented by piloting and upscaling innovative design, and low cost climate resilient construction. Activities to be financed include, among others: cost of road construction, consultancy services, training of PWD personnel – especially on climate resilient design and construction as well as of bio-engineering measures for erosion control of road embankment.

118. It has been envisaged that implementation of access road rehabilitation; and infrastructure development including upgradation and modernization of agricultural wholesale markets and warehouse and other major civil works under the project will be the responsibility of PWRD, in coordination with the requirements of respective line departments/agencies.

119. **Implementation Approach:** Roads will be constructed using innovative technologies which are of climate resilient construction. The crust composition of the road will be of granular materials base course of 200 mm over a prepared subgrade, two layer of WBM with grade 3 materials, followed by Interlocking Concrete paver blocks (ICPB) of 80 mm thickness and with proper drainage as per requirement of site. As per availability of Right of Way (ROW), the pavement of the road will be generally of intermediate standard (5.5 m wide) having a road width of 7.5 m; wherever the road width is required to be restricted due to non availability of Govt. land, the same will be minimum of 6 m with a pavement width of 3.75 m. The required size of drain/ cross drains will be constructed as per the availability of land without any involvement of acquisition of land. All the works will be carried out as per the technical specification recommended by the IRC. The use of concrete blocks as the pavement surface saves time and also cost effective in terms of longevity of the road. The use of concrete block pavement is also environment friendly because use of bitumen will be eliminated which results in non hazardous of the environment. As a matter of principle Roads having R&R issues will not be taken up under the project.

(a) Individual consultant having good experience in quality checking of works of roads, markets, warehouses would be engaged as Technical Examiners for regular quality checking to ensure good quality of works. For strengthening the field implementation unit, experienced graduate/diploma engineers will be engaged on contract basis.

(b) DPRs would be prepared taking into consideration the actual site conditions and with almost accurate calculation of the quantity of BOQ. All supervisory unit of the PWD would be trained so as to enable them to administer the contract efficiently.

(c) Consultants will be engaged for survey and design of markets based on the site specific requirement as per prototype design of NIAM and as per implementation carried out under AACP-AF. Consultants will also be engaged for preparation of lay out plan, design and drawings of warehouse repair/ renovation including infrastructure development of the yard and preparation of DPR etc.

120. Summary of cost:

Item of Expense	Unit	Quantities					Cost (Rs. Lakhs)			
		2017	2018	2019	Total	Unit Cost (L)	2017	2018	2019	Total
A. Rehabilitation of Access Roads	Kms	-	50	50	100	120	-	6,000	6,000	12,000
B. Consultancy	Ls						650	550	320	1,520
C. Training workshops	Ls						20	30	30	80
D. Incremental Operating Costs	Ls						160	120	115	395
Total							**830**	**6,700**	**6,465**	**13,995**

121. Results Framework

Indicator name	Baseline	Cumulative target values						
		Y-1	Y-2	Y-3	Y-4	Y-5	Y-6	EOP
Rural roads upgraded with climate resilient technologies (km)	0	0	50	100	100	100	100	100
Increased traffic density on completed roads (%)								200
Rural Population in project district served by roads upgraded with climate resilient technologies (%)					10			20

Sub-Component:B.2.2: Warehouse and warehouse receipts development

122. Warehouse and warehouse receipts development: The objective of this activity is to provide farmers and agro entrepreneurs, with high quality storage, access to finance through warehouse receipts, and option to sell via commodity exchanges. This would be done by up-gradation and modernization of selected warehouses of the Assam State Warehousing Corporation (ASWC) located within the project districts to provide scientific storage; accreditation and registration of such warehouses with Warehousing Development and Regulatory Authority (WDRA); partnering with commercial banks and collateral management agencies for negotiable warehouse receipt (NWR) financing of the stored goods; and piloting to enable online trading of selected commodities which allow such warehouses to be accredited as delivery centers for national electronic commodity exchanges.

123. Policy and regulatory environment: The Policy and regulatory environment for Warehousing sector in Assam & India is as follows:

(a) The Assam State Warehousing Corporation (ASWC) is the nodal state agency under the Cooperation Department of the GoA. It has its own rules and regulations.

(b) Warehousing in India is governed by the Warehousing (Development and Regulation) Act, 2007 for the development and regulation of warehouses, Regulations of Negotiability of Warehouse Receipts and promote orderly growth of the warehousing business and the Warehousing Development and Regulatory Authority (WDRA) of the Government India is the apex authority which regulate and ensure implementation of the provisions of the Act.

124. The approaches to be adopted for this subcomponent are

(a) Revamping the warehousing operations of ASWC in selected APART districts aimed at accreditation of the warehouses through infrastructure up gradation & Business Process Re-engineering, targeting introduction of e-Negotiable Warehouse Receipts (e-NWR) in collaboration with commercial banks, and supported by better clientele relationship.

(b) Need based infrastructure up gradation of ASWC assets in APART prioritized district with special focus on Agri. & allied commodities by means of supporting the notified commodities for the purpose of warehouse accreditation.

(c) Redesigning the entire commodity handling business process of ASWC with special focus on business volume enhancement, product value preservation, cost control and assured customer oriented support services.

(d) Strengthening client & market linkages through quality services and extensive outreach programmes aimed at reaching out to the primary producers for long term business associations.

125. Eligibility and Selection Criteria:

(a) The Warehouses are selected on the following basic criteria:

(i) **Location**: Warehouses located in the project districts and nearby the project clusters, where considerable aggregation of food grains are happening.

(ii) **Accessibility**: Warehouses located near the arterial road and easily accessible.

(iii) **Connectivity**: Availability of Power & telephone connectivity.

(iv) **Staffing**: Availability of technical & skilled staff for management of Warehouses.

(b) There are total 90 warehouses within project districts, and of the same, 11 Warehouses are used for Tea and Chemicals and 18 Warehouses have been sanctioned under other schemes of GoA for up-gradation. Thus, there are 61 remaining Warehouses units within the project districts and of the same total 33 Warehouses units, spreading in 8 project districts, are proposed to be considered under the APART following the aforementioned criteria. Our of rest 28, 22 Warehouses cannot be converted for storage of Agri commodities as they are reserved for operational agreement with agencies dealing with Fertilizer, Cement, Paper, Reel etc. Out of the remaining 39 warehouses, top 33 have been taken based on storage volume capacity.

(c) On basis of the above, the following **33 Warehouses** were selected for Revamping and up-gradation operations under the sub-component:

Sl.	Location	Name of undivided district	No of warehouse units	Capacity in M.T
1	Rangia	Kamrup	1	1850
2	Paschimborgaon	Kamrup (M)	2	4000
3	Maidamgaon	Kamrup(M)	7	15050
4	Goalpara	Goalpara	2	3516
5	Howraghat	Karbi-Anlong	2	4532
6	Langhin	Karbi-Anlong	1	1500
7	Haiborgaon	Nagaon	3	9000
8	Hojai	Nagaon	4	6097
9	Raha	Nagaon	2	4000
10	North Lakhimpur	Lakhimpur	1	2000
11	Khrupetia	Darrang	6	7583
12	Golaghat	Golaghat	1	2500
13	Sarupathar	Golaghat	1	2500
		Total	33	64128

(d) The operational history of the above warehouses in these locations has a proven track record of high success. The current annual operations and utilization is about 65% to 75% and it is expected to get enhanced after revamping and upgradation works are completed.

126. Activities to be covered under this sub-component

(a) Existing Infrastructure in the identified Warehouses: Most of the selected Warehouses were constructed during decade of 1970-80. Due to wear and tear specially the floor & roof, the Warehouses have become deplorable, and hence are unsuitable for scientific storage of food grains, pulses etc. Further, due to raising of the road level near the Warehouses, most of the Warehouse Complexes are facing the problems of acute water logging especially in rainy season. In addition the approach roads and internal roads are in very bad shape and hence need up-gradation. There are hardly any basic facilities like sanitation or potable water in most of the Warehouses. The Warehouses also do not have Weigh-Bridge (except Haiborgaon), and commodity testing equipments.

(b) **Proposed Interventions:** Total 16 warehouse units will be taken up for improvement in the second year and remaining 17 warehouse units will be taken up in the third year. Accordingly, total 33 warehouses will be developed by end of third yea.

(c) **Improvement and up-gradation of the Infrastructure:** APART will support improvement of the above mentioned 33 Warehouses. The existing infrastructure of the warehouses will also be upgraded e.g. by provision of computers with web connectivity and electronic weighing machines etc,. In addition, program for setting up of electronic warehouse receipt generation system in the 33 warehouses will be undertaken.

(d) **Long Term Storage & Collateral Funding:** Towards this, it is proposed to form partnerships/ collaborations are with commercial banks, commodity exchanges and collateral management agencies.

(e) **Process Improvement:** ASWC will improve existing stock management process by imparting training to the field staff directly dealing with stocks. Modernization of the warehouse equipments, computerization of entries etc. will be done. Fresh recruitment of contractual staff will ensure promptness of services and proper maintenance of stock.

(f) **Improvement of Internal Roads**: Programs for improvement of internal roads and yard area will also be undertaken.

(g) **Product value preservation**: Towards this activities like – (i) Replacement of wooden crates by modern PVC moulded floor pallets; (ii) Provision for prophylactic treatment, fumigation cover, foot operated sprayers, hand sprayers, duster masks, gloves, boots etc. and (iii) Provision of assaying instruments e.g. moisture meter, grading set, electronic weighing scales (100 Kg to 500 Kg) sample packing items, will be undertaken.

(h) **Assured customer orientated support services**: The efficiency of the services being offered by the ASWC, will be enhanced thorough Capacity Building programs and also arrange annual depositors meet, traders meet etc with stakeholders, insurance & financial service providers.

(i) **e-NWR installation and operation**: The current manual NWR systems would be upgraded to web enabled services through complete reorientation of material transaction process. The operations that shall be included are - ERP System covering Vendor engagement, System Development & installation charge, Training and implementation and Recurring operational expenses

127. Implementation arrangement:

(a) Implementation of the improvement works of the warehouse including the internal roads will be the responsibility of the PWRD, in coordination with the ASWC. DPR preparation of the warehouse modernization will be carried out by suitably qualified consultants in active consultation with ASWC and other relevant stakeholders, based on which the program will be implemented. Up-gradation and modernization proposal will be prepared relevant. The project will also support the recruitment of independent Field Engineer to ensure compliance with design, technical specification and contract conditions.

(b) The Operational Project Implementation Unit (OPIU) of the ASWC will have the responsibility of implementation of all other activities of the sub-component.

128. Budget: The following is the tentative budget for this sub-component-

Rs in Lakh

Activity / per year	Y-1	Y-2	Y-3	Y-4	Y-5	Y-6	Y-7	Total
Modernization of infrastructure	322	3,224	2,239	188	-	-	-	5,972
Training & Awareness	4	21	22	4	-	-	-	51
Registration and accreditation	-	26	25	-	-	-	-	51
ERP System	-	114	5	5	5	5	-	134
Operational PIU Costs	3.60	20.60	9.10	10.95	-	-	-	44.25
Total	**330**	**3406**	**2300**	**208**	**5**	**5**	**0**	**6252**

129. Results Chain and Key output indicators:

(a) **Results Chain**

Activities	Sub Activities	Output	Outcome
Designing of warehouses for improvement	Improved Design Report	Modern Warehouse Design	Better, safe and durable storage
Improvement of warehouses (civil works)	Preliminary survey (jointly with PWRD)	Budgeting for warehouse development	Increased revenues and better price realization by farmers/traders
	Cost assessment		
	Construction (civil) work	Better and more storage capacity available to farmers	
Up-gradation of warehouses (equipments. Tools etc)	Installation of weighing machines	Quality assessment services available to farmers/traders	Better price realization by farmers/traders
	Assaying facilities		Description based sales of agri produce possible
Supervision of civil works	Hiring of service provider	Better carrying out construction work	Better quality of civil works
Accreditation of warehouses	Fulfilling the pre-requisites	Warehouse accredited	Increased number of warehouses eligible for registration with WDRA
	Hiring of the accreditation agency		
Registration of Warehouses with WDRA	Application to WDRA	Warehouses registered with WDRA	Warehouses eligible for issuing electronic Negotiable Warehouse Receipts (eNWRs)
Installation of ERP System	Hiring of service provider	ERP System installed	Networking of all warehouses and better & transparent operations and management of warehouses
Warehouse Receipt Financing System	Collaboration with banks	Issuing of warehouse receipts to farmers and traders on deposit of their produce	Increase in bank loans available to farmers & traders against warehouse receipts
	Networking of warehouses		

(b) **Results Framework**

Indicator Name	Baseline	Cumulative Target Value						
		YR-1	YR-2	YR-3	YR-4	YR-5	YR-6	EOP
1) Up-gradation of Warehouses (in Nos)		-	16	33	33	33	33	33
2) Warehouse receipt financing	15	15	1000	5000	10,000	15,000	20,000	25,000
2) Warehouse receipt financing (value in INR lakhs)	0	-	-	5	10	15	20	25
3) Electronic Weighing scale installed (Nos)	-	-	16	33	33	33	33	33
4) Training (no. of persons)	-	-	50	100	100	100	100	100
5) Higher storage capacity achieved (in M.T)			31100	64100	64100	64100	64100	64100

130. Sustainability: The outcome of the investment on this subcomponent will be sustainable due to the following aspects-

(a) Modernized Warehouses with Warehouse Receipt arrangement would attract more farmers to keep their produce in the ASWC's Warehouse & which will ensure additional income/financial support to ASWC to maintain the warehouses and this would make the investment sustainable.

(b) The scientific storage and interim finance provided against Warehouse receipt would reduce post harvest losses and the same time, it would meet the immediate financial needs of the farmers. This would make investment under this subcomponent sustainable.

(c) The benefit of sale at the time when market prices are higher would be available to the farmers.

(d) The Warehouse infrastructure and web connectivity with suitable marketing network developed under the project will be a source of additional income to ASWC.

131. Risk and mitigation measure:

Sl	Risks	Description	Risk Mitigation Measures
1	Technical / Design failure	Networking of **33** of Warehouses is a new concept that will be implemented under the Project.	Training and capacity building for establishment of networking for 33 no warehouses.
2	Social and environment safeguard	-	Agricultural Produce being non-hazardous they pose no environment risk.
3	Implementation Capacity and sustainability	Operations of Warehouse receipt system through ASWC will have to be accepted by depositor community.	Training and capacity building for operations of warehouse receipt system through ASWC's warehouses

Sub-Component: B.2.3: Up-gradation & modernization of agricultural wholesale markets

132. Up-gradation and modernization of agricultural wholesale markets: **Overview of the sub-component**: The marketing of most agricultural commodities in Assam is fragmented and uncoordinated, involving layers of intermediaries and markets with inadequate infrastructure and facilities, and supply chains involving high wastage and losses. The project will upgrade and modernize selected agricultural wholesale markets by enhancing efficiency and reducing transaction costs, enabling automation of the business processes in the selected market and also open-up stand-alone physical markets to distant buyers. To achieve this goal, this activity will support upgrading and modernizing the market infrastructure in agriculture wholesale markets, including about 10 wholesale markets managed by Agriculture Produce Market Committees (APMCs); and about 65 rural periodic markets (haats) owned by local bodies. The infrastructure that would be needed in these markets would emerge from the market needs assessment through participative consultation with market users. This process will be facilitated by a qualified service provider. Illustrative basic infrastructure facilities that will be provided include: (i) sales platforms (auction yards, structures); (ii) covered/auction shed; (ii) toilets, and (iv) drinking water facility.

133. Background: Agricultural produce markets in Assam are controlled by three different agencies. These are: (i) Regulated markets by Regulated Market Committees coming under Assam State Agricultural Marketing Board (ASAMB); (ii) Weekly rural haats managed by Village Panchayats, Anchalik Panchayat or Zilla Parishad and (iii) Town Committees and Municipal Markets, operated and managed by Urban Local Bodies (ULBs). Moreover, a few markets are run by individual/group of individuals which may be termed as Private Markets. Such markets are fully controlled and managed by the private entities.

134. Policy and Regulatory Environment

(a) As per the provisions of **Assam Agricultural Produce Market (AAPM) Act, 1972** Govt. of Assam constituted 24 nos. of Regulated Market Committees all over the State, except the areas of sixth schedule areas, under this Act. The State Agricultural Produce Market Act aims at regulating marketing practices mainly at Assembly Market Level.

(b) **The Assam Panchayat Act, 1994**: The salient features of the act pertaining to management and operation of rural haats are as follows. “Bazar, Haat or Market” means any place within administrative control of the local authority where persons assemble daily or bi-weekly or periodically for sale or purchase of articles of human or animal consumptions or of livestock or of other merchandise.

(c) **Assam Municipal Act, 1956:** “Municipal Market” means a market belonging to or maintained by the Municipal Board. The (Municipal) Board if decided in a meeting may use their own land or with building or land purchased, taken on lease or otherwise acquired with or without building for the purpose of establishment of a Municipal Market, Bus Stand, Truck Stand, Taxi Stand, Auto Stand and Parking yard for improving any existing Municipal Market, Bus Stand, Taxi Stand, Auto Rickshaw or Rickshaw Stand and Parking Yard.

(d) **Proposed Assam Agricultural Produce Marketing (Regulation and Development) Act, 2016:** A new act under the name and style “The Assam Agricultural Produce Marketing (Regulation and Development) Act, 20016 is under process of finalization and is likely to be enacted within a short time.

135. Sub-Component Objectives

(a) **Strengthening Access to markets by the farmers:** Physical access to market is constrained by bad condition of the roads and high transportation cost. The rural markets often become inoperable because of water logging, particularly in rainy season. There are no physical facilities like

pacca yards, auction platforms, trader's and retailer's sheds, aggregation sheds, drinking water and toilets, drainage, electricity, electronic weighing scale, electronic display board, internal roads, parking yards, loading and unloading bay in rural haats Detailed eligibility and selection criteria of these markets are explained in Article V below.

(b) **Ensuring Better Price Realisation by the Farmers:** Ensuring a transparent price discovery mechanism and gets a fair deal for his produce as per quality through presence of sufficient numbers of buyers and sellers in the market and open auctions. The present method of sale is traditional, non-transparent and coercive. Price determination is by one to one negotiations rather than organized auctions.

(c) **Abolishing market malpractices:** At present there is no system of grading or assaying of agricultural produce, electronic weighing machines are not available in the markets. Weighment is done by a physical scale which is just approximate. Large amount is taken as sample. Price is decided by visual inspection.

(d) **Capacity building of farmers, traders and other market functionaries:** It is important that all the value chain players are sensitized of the long run benefits of a transparent agricultural produce marketing system by imparting training on Good Agricultural Marketing Practices (GAMPs), so that they can take better and informed decisions and their profit margins are optimized commensurate with their contribution to the value chain.

136. Eligibility and Selection Criteria for Markets

(a) **Economic eligibility:** The selected market for project interventions should be in/around either Agri-Horti cluster or Fishery cluster or Pig cluster. This will be driven by movement of commodity and volume of the same in the selected production/enterprise clusters.

(b) **Physical eligibility:** Access to road, utilities, commodity arrivals, etc.

(c) **Selection criteria for Markets**:

- Each of the selected location should have acquired the requisite land with clear title and possession
- The past three year average turnover of the market yard should be constantly growing in volume
- The past three year average turnover of the market yard should be constantly growing in value
- Access to Road
- Access to Power
- Access to other utilities
- The markets which have been developed under earlier World Bank funded projects AACP & AACP-AF, will not be considered
- In case of RMC markets the concerned RMC should have enough cash reserve surplus in the last three years to cover for market development work
- The RMC should have last three years books of accounts which are audited. There shall not be any serious audit observations.

(d) **Selection criteria for development of electronic auction and spot exchange/ e-NAM**:

- Wholesale market;

- Should be known for at least one commodity's considerable arrivals (special commodity market);
- A large number of buyers and sellers of that commodity should be coming to the market. Majority of the sellers should be from Assam State;
- The commodity traded should have a good market outside the State, preferably pan India. In case of perishables, it should be available in a season when rest of India has an off season for that commodity;
- Should be a regulated market, with internet connectivity and single license and single point of levy and should have Assaying facilities.

137. Activities to be financed including illustrative list of investment

(a) **Rural Haats (RH) development**: Those rural haats which are lying near the production clusters will be selected for improvement. For this a match making exercise between production clusters and existing rural haats will be done. A base line survey of the existing facilities in the rural haats will be done. Haats to be improved will be identified based on set criteria.

(b) **RMC Markets/Wholesale Markets development**: Those RMCs/wholesale markets which lie in production clusters will be identified to get a long list. From the long list, markets will be selected based on set criteria. Currently, it is found that about 10 RMC markets lie in production clusters. These are Barpeta (Lentil, Pea, Maize, Tomato, Pumpkin), Darrang (Maize, Mustard, Pea, Blackgram, Cabbage, Cauliflower, Tomato), Dhubri (Black gram, Mustard, Lentil, Maize and Onion), Golaghat (Mustard, Black gram, Pea, Ginger, Tomato, Pumpkin), Kamrup (Brinjal, Cabbage, Cauliflower, Tomato, Banana), Nagaon (Maize, Cauliflower, Brinjal, Pumpkin, Banana).

(i) Illustrative details of investment in different categories of market:

Sl.	Particulars	Approx total area/capacity	Unit rate	Total (Rs. Lakhs)
1	Covered Market Shed (4 units, 4000 sq.ft. each)	16000 sqft	Rs. 800/ sqft	128.00
2	Loading, unloading area	1	Lump sum	1.50
3	Drinking water facility (With HTW)	1	Lumps sum	0.75
4	Toilet block (For ladies and gents)	1 unit	Rs. 475000/unit	4.75
5	Market yard improvement by paver block (Over WBM)	50000 sqft	Rs. 200/sqft	100.00
6	Electricity	--	LS	5.00
7	Drainage	--	LS	10.00
	Total	**--**	**--**	**250.00**

(ii) **Agri & Horti commodity market (RMC markets and Rural Haats:** Total 40 nos. of agri & horti commodity markets (10 RMC + 30 Rural Haats) are being planned for development. List enclosed at *Annexure-B-2.3 (a).* In case of RMC markets considered- Contribution of RMC (20%) = 50.00 lakhs; Contribution of APART (80%) =200.00 lakhs; Total= 250.00 lakhs.

(iii) **Fish market**: Altogether 20 nos. of Fish markets are being planned for development under this project. List enclosed at *Annexure-B-2.3 (b)*

Sl.	Particulars	Approx total area/capacity	Unit rate	Total (Rs. Lakhs)
1	Closed auction platform with shed	4500 sqft	Rs. 1600/ sqft	72.20
2	Retailer sheds (25 sheds, each 180 sq.ft.)	4500sqft	Rs. 800/ sqft	36.00
3	Drinking water facility (With DTW)	1	Lumps sum	3.00
4	Toilet block (For ladies and gents)	1 unit	Rs. 475000/unit	4.75
5	Market yard improvement by paver block (Over WBM)	2000 sqft	Rs. 200/sqft	4.00

Sl.	Particulars	Approx total area/capacity	Unit rate	Total (Rs. Lakhs)
7	Electricity	--	LS	5.00
8	Drainage	--	LS	5.00
	Total	**--**	**--**	**129.95**
	Say			**130.00**

(iv) **Pig market (with arrival of agri & horti commodities):** Altogether 15 nos. of Pig markets are proposed for development under this project. List enclosed at *Annexure B-2.3 (c)*

Sl.	Particulars	Approx total area/capacity	Unit rate	Total (Rs. Lakhs)
1	Covered Market Shed (4 units, 4000 sq.ft. each)	16000 sqft	Rs. 800/ sqft	128.00
2	Pork vending sheds	1000 sqft	Rs. 1000/ sqft	10.00
3	Piglet aggregation sheds	1000 sqft	Rs. 800/ sqft	8.00
4	Loading, unloading area	1	Lump sum	1.50
5	Drinking water facility (With HTW)	1	Lumps sum	0.75
6	Toilet block (For ladies and gents)	1 unit	Rs. 475000/unit	4.75
7	Market yard improvement by paver block (Over WBM)	50000 sqft	Rs. 200/sqft	100.00
8	Electricity	--	LS	5.00
9	Drainage	--	LS	12.00
	Total	**--**	**--**	**270.00**

(c) **Electronic auctions and Spot exchange**: Select RMC markets will be provided with electronic auction and electronic spot exchange facilities. Additional cost of this e-infrastructure will be Rs. 50 lakhs per market. This would be done for markets receiving one or two particular commodities arriving in high volumes based on set criteria listed above.

(d) **Capacity building**: (Capacity building comprises of trainings, exposure visits, communication and best practices, etc. would be incorporated. The costs to this end are provided in the cost tables) Along with the hard interventions, training and capacity building is an important area and cannot be neglected.

138. Institutional and Implementation Arrangement: Implementation of modernization of agricultural markets will be the responsibility of PWRD, in coordination with the respective line departments/agencies. Design for the markets will be prepared by PWRD through external consultants and in consultation with the relevant stakeholders of the market and the respective OPIUs/agencies, and based on the same, the program will be implemented. Independent Market Field Engineer (MFEs) will be engaged to ensure compliance with engineering design, technical specification and contract conditions.

(a) **RMC Markets/wholesale markets**

(i) PIU-ASAMB will be responsible for providing necessary support to the PWRD for the RMC market modernization program.

(ii) **Awareness generation about the project:** The process of Market Modernisation and Improvement Plan (**MMIP**) starts with awareness generation about the project in the RMC command area. During the meeting all the market users and other stakeholders would be invited and will be informed about the project, its objectives, approach and process, possible intervention and expected benefits.

(iii) **RMC Assessment:** Assessment of RMC to commit itself for the MMIP would be carried out. This assessment would cover the willingness and capacity of RMC to undertake the necessary

changes in the RMC management and operations and financial ability to provide its contribution towards investments.

(iv) **Demand analysis and estimating market turnover:** Once the MoU is signed, analysis of existing production, consumption and trade volume in the RMC using past 3 year data would be undertaken. This will help in understanding how the RMC relates to the other marketing channels. This would essentially answer questions pertaining to a) is the trade volume increasing, b) what is the change in the trade pattern.

(v) **Participative Consultation**: Participative consultation would be carried out through PRA (Participative Rural Appraisal) technique. This will ensure that the investments in the market meet the user needs.

(vi) **Prioritization of Needs**: The investment needs would be prioritized with the market users based on the budget available under the project.

(vii) **Signing of Memorandum of Understanding (MoU) between the RMC and ARIAS Society**: Once the awareness generation process and the assessment of RMC are completed, formal signing of MoU with the RMC and the Project would be done. This will delineate the commitments and mandates of the two parties towards each other.

(viii) **Preparation of design and work estimate**: After identification of the investment interventions, the design and cost estimates for the civil work and other related activities will be prepared by the Consultants engaged by PWRD in consultation with the Work Sub Committee of the RMC.

(ix) **Financing pattern**: The RMC would contribute to the extent of 20% from their own funds or by leveraging ADF (Agriculture Development Fund) of ASAMB as per committee decisions.

(x) **RMC Market Modernisation Account**: The RMC will open separate account with the nearest branch of the Nationalised Bank. The contribution of the RMC will be deposited in this account before the modernization works are started.

(xi) **Preparation of MMIP**: MMIP will include the PERT Chart, design, cost estimates of the investments, financing pattern and address the issues relating to changes to be done in the RMC operations and management. It would also have a detailed project feasibility study, list of monitoring and evaluation indicators etc.

(xii) **Endorsement of the MMIP in the general body of RMC**: After the design, cost estimates and the implementation plan for all interventions have been prepared, it will be compiled into MMIP document. MMIP will be presented to the RMC General Body. The Design Consultants in charge of the MMIP preparation will discuss and clarify all queries related to the MMIP implementation plan, designs and cost estimates. Based on the discussions, any required change would be carried out.

(xiii) **Procurement Phase**: After designs are prepared and agreed by all the stakeholders of the market, PWRD will undertake the necessary procurement actions for engaging suitable contractors as the norms of the World Bank applicable for APART.

(xiv) **Construction phase**: Construction works will be supervised jointly by the PWRD and the ASAMB and an independent third party technical monitoring consultant (Market Field Engineer) will be engaged for verifying the quality of construction.

(xv) **Payment for the construction works**: Bills for completed portion of the works will be certified jointly by the supervising engineer of ASAMB and the PWRD, and counter signed by the third party technical monitoring consultant (Market Field Engineer) certifying the quality of construction.

Such passed bills will be sent to the concerned Ex. Engineer/ Chief Engineer, PWRD for payment as decided.

(xvi) **Funding pattern**: 20% of the cost of construction will be borne by the RMC/ASAMB. This 20% will be spent first, UC submitted and then project funds will be utilized.

(xvii) **Transparency and accountability**: The lists of works to be taken up will be given wide publicity by means of display in the office of RMC or other public institutions within the area.

(xviii) **Maintenance fund**: 1% of the investment cost will be kept aside for maintenance of the developed markets and will be deposited in a separate account opened for the purpose.

(xix) Clearance of RMC markets development will be taken from ASAMB

(b) **Rural Haats:**

(i) **Awareness generation about the project**: The process of RH Modernization and Improvement Programme (RHMIP) will start with awareness generation about the project in the RH command area. During the meeting all the market users and other stakeholders would be invited and will be informed about the project, its objectives, approach and process, possible intervention and expected benefits.

(ii) **Assessment**: The haats which are managed by the village Panchayats, an assessment of the management of the market will be carried out. This assessment *inter alia* will cover the willingness to undertake the necessary changes in the haat management and operations. The list of changes, if any, would be shared with Panchayat and an endorsement received. This task will be accomplished by ASAMB through a Service Provider.

(iii) **Signing of Memorandum of Understanding (MoU) between the Panchayat, PWRD and ASAMB**: Once the awareness generation process and the assessment of Panchayat is completed, formal signing of MoU with the Panchayat, PWRD and ASAMB will be done. This will delineate the commitments and mandates of the three parties towards each other.

(iv) **Participative Consultation**: Participative consultation would be carried out through PRA (Participative Rural Appraisal) technique by the SP. This will ensure that the investments in the haat meet the user needs.

(v) **Preparation of design and work estimate**: After identification of the investment interventions, the design and cost estimates for the civil work and other related activities will be prepared jointly by the PWRD and ASAMB.

(vi) **Procurement Phase**: After designs are prepared and agreed by all the stakeholders of the market, PWRD will undertake the necessary procurement actions for engaging suitable contractors as per the norms of the World Bank applicable for APART.

(vii) **Construction phase**: Construction works will be supervised jointly by the PWRD and the ASAMB and an independent third party technical monitoring consultant (Market Field Engineer) will be engaged for verifying the quality of construction.

(viii) **Payment for the construction works**: Bills for completed portion of the works will be certified jointly by the supervising engineer of ASAMB and the PWRD, and counter signed by the third party technical monitoring consultant (Market Field Engineer) certifying the quality of construction. Such passed bills will be sent to the concerned Ex. Engineer/ Chief Engineer, PWRD for payment as decided.

(ix) **Preparation of Rural Haat Modernization and Improvement Plan (RHMIP):** RHMIP will include the PERT chart, design, cost estimates of the investments, financing pattern and address the issue of changes to be done in the haat operations and management.

(x) **Endorsement of the RHMIP by Panchayat and Concerned Market Committee:** After the design, cost estimates and the implementation plan for all interventions have been prepared, it will be compiled into RHMIP document. RHMIP will be presented to the Panchayat and concerned market committee for their ratification. The third party service provider in charge of the RHMIP preparation will discuss and clarify all queries related to the RHMIP implementation plan, designs and cost estimates.

(xi) **Rural Haat Maintenance Account:** The GP will open separate account with the nearest branch of the Nationalised Bank. 10% of the lease amount will be deposited in this account for maintenance of the market.

(xii) **Transparency and accountability**: The lists of works to be taken up will be given wide publicity by means of display in the office of Village Panchayat or other public institutions within the area.

(xiii) Master plan of the markets to be developed will be approved and cleared by the concerned authority

Note: Initially on a pilot basis, ten (10) Rural Haat markets would be handed over to ASAMB/Concerned RMCs for operating the markets by handling the infrastructures belonging to the Gram Panchayats on a revenue sharing model.

139. Estimated Cost: Estimated cost for market development activity is briefly provided below. Details are available in cost tables.

Figures in Rs. Lakhs

Item of expenditure	Y-1	Y-2	Y-3	Y-4	Y-5	Y-6	Y-7	Total
Market development	**250**	**4,700**	**8,066**	**4,500**	**-**	**-**	**-**	**17,516**
Capacity building	17	35	35	35	35	13	-	169
OPIU level cost	92	30	130	30	30	30	30	369
Total	359	4765	8231	4565	65	43	30	18054

140. Sustainability: Modern infrastructure in the market will attract more arrivals because of reduction in losses, increased revenue due to more stakeholders participation, and that will make the investment sustainable. The infrastructure can also be outsourced for better management and can generate income.

141. Risk and Mitigation Measures.

Sl.	Risks	Mitigation
1	Unwillingness from farmers and traders to participate in the new system	Use of efficient market information tools by the farmers
2	Lack of proven technology / unwillingness to access technology	
3	Loss in transportation	Insure against loss or damage during transportation. Use improved packaging techniques
4	Technology risk	Use robust and proven technology platform only by reputed and proven technology providers
5	Resistance of signing of MoU with ARIAS by RMC and P&RD	Amendment of concerned Acts will be done.

142. Results Chain

Activities	Sub Activities	Output	Outcome
Identification of Markets in the vicinity of production clusters to be improved under Project assistance	Market surveys and baseline studies based on set criteria	Increased perennial flow of agricultural commodities to the markets	Increase in trading volume through improved markets
Identification of Link Roads to Markets in selected Districts	Survey and assessment of roads near the production clusters and adjacent markets	Better linkages to the markets	
Construction / up-gradation of identified roads	Construction, civil works and physical infrastructure development	Increased number of farmers / traders having better access to markets	
Improving infrastructure in selected markets		Increased participation of farmers / traders in the markets	
Introduction of transparent price discovery system in the market for sale & purchase of selected agricultural commodities	Identification of commodities and markets for introduction of and electronic auction and spot exchange (open auction will be introduced in all markets in production clusters)	List of prioritized commodities and markets for introduction of e auctions and spot exchange	
	(Awareness /motivation programmes to attract enough numbers of large buyers and sellers to facilitate open auction)	Long list of prospective large buyers who may be invited for buying in the selected markets	
	Creation of grading, sorting, assaying facilities, electrification, internet connectivity etc in identified markets	Availability of graded and tested commodity in the market	
	Hiring of agency for creation of e infrastructure facilities	E-auction and spot exchange platform successfully started	
	Introduction of e auction and spot exchange facilities		
Setting up Electronic spot exchanges in selected wholesale markets	Agreement and formalities completed with agencies for setting up electronic spot exchanges in the identified markets	Increased number of wholesale markets setting up electronic spot exchanges	Increased price realisation by the farmers through electronic trading
Introducing electronic trading platform for the selected commodities	Agreement and formalities completed with agencies for setting up electronic trading platform for selected commodities	Increased number of wholesale markets that have moved to electronic trading platform	
Linkage of rural haats with wholesale markets of the state	Survey of routes linking markets to enterprise clusters in terms of road conditions etc	Status of link roads available	Increased arrivals in wholesale markets and increased business volumes. More number of buyers including processors in the
	Identification of roads to be developed &	Nature and fund requirement for link road development	

Activities	Sub Activities	Output	Outcome
	preparation of DPRs	work	wholesale market
	Procurement of road development agency	Link roads developed	
Providing need based regulatory support to farmers, traders, entrepreneurs and exporters of agricultural commodities.	Arranging stakeholders meeting to propagate the aim and objectives of the project APART and have their feedbacks, suggestions, etc.	Better understanding of the proposed act on Assam Agri Produce Marketing (Regulation and Development) Act 2016	Efficiency of agricultural marketing system in the state. Effective value chains
	Amendment of existing AAPM Act, the Assam Panchayat Act and the Assam Municipal Act.	New Act in Place	
	Formulation of rules to the act	Rules to the new act in place	
	Implementation of the act/rules	Efficient marketing of agricultural produce in the state	

143. Results Framework

Indicator name	Baseline	Y-1	Y-2	Y-3	Y-4	Y-5	Y-6	EOP
Increase in trading volume through improved markets (Percentage)	0	5	5	10	15	15	20	20
Number of Markets Upgraded (Number)	0	0	15	50	70	75	75	75
Number of E-Trading Facility / Spot Exchange Platforms Operational (Number)	0	0	0	1	2	4	4	4
Number of Open Auction Platforms Operational (Number)	0	0	0	9	19	30	30	30
Number of motivational seminars conducted to attract buyers/sellers to the markets (Number)	0	16	48	80	112	144	144	144

Component C: Fostering Market-led Production and Resilience Enhancement

144. Component C: Fostering Market-led Production and Resilience Enhancement: The objective of this component is to enable producers of the priority value chain commodities, in the targeted clusters to take advantage of the rapidly changing market demand, and enhance resilience of agriculture production systems for increasing production and managing risks associated with climate change. This farm focused component will adopt a cluster-based value-chain approach for providing support to producers and will closely work with components A and B to inform producers in these clusters of the market demand. This would be achieved by: improvements in production technologies and management practices; introduction of climate resilient solutions; facilitation of collective-action by producers by supporting the establishment of farmer producer organizations (FPOs); imp6roving value realization at the farm level through improved cleaning, grading and packing of produce through Common Service Centers (CSCs) managed by FPOs; better input and output market linkages; and facilitating access to a broad set of financial services and their responsible use by producers. The key activities to be financed include: (i) upgrading technology, breed quality, and management practices of priority value chains, through demonstrations, training and capacity building of producers and line department staff; (ii)hiring services of consulting firms/NGOs to mobilizing and organizing farmers and establish FPOs as well as provide technical assistance and market linkage services to these FPOs and implementing the financial services activities; (iii) matching grant to finance demand-driven investments to FPOs for establishing CSCs; and (iv) program cost for collaboration with CGIAR centres and other relevant agencies. The main outputs expected are higher productivity in agriculture, livestock, fisheries and sericulture; improved alignment of productive activities with market needs; better price terms for the producers in the clusters; and improved resilience of production systems.

145. This component will adopt a cluster-based value-chain approach for providing support to producers for sustainably increasing their production and productivity; linking the producers with emerging supply chains, modernized wholesale agriculture markets and warehouses, under component B; and facilitating partnership opportunities with strategic and potential anchor and leading firms, supported under Component A. This component has the following three subcomponents:

C1. Promoting climate resilient technologies and their adoption

C2. Facilitating market linkages through market intelligence and product aggregation

C3. Facilitating access to and responsible use of financial services

Two pillars of this component (i) prioritized value chains of agricultural commodities, and (ii) climate resilient production clusters.

146. Prioritized Value Chains: Since it was difficult to find indicators that were both comparable and available for different types of agriculture and allied value chains, the project team constructed a set of indicators, both quantitative and qualitative, for identifying priority commodities in agriculture and allied sectors. The indicators included: (i) relevance of the commodity for the domestic market (Assam and other north eastern states), and the potential for import substitution (including from mainland states of India); (ii) commodities that have proven comparative advantage, and where market dynamics indicate strong investment and poverty reduction potential;(iii) synergy potential between commodities (e.g. maize and mustard by products are critical for unlocking the feed requirement of livestock and fish sectors); (iv) commodities with significant volume and prospect for value addition; (v) scope for private sector-producer linkages; and (vi) participation of wider beneficiaries. Field investigations, consisting of interviews and observations, were carried out for a comprehensive assessment of the identified

commodities. Also, the project team involved different stakeholders through wide ranging consultations to validate findings from the desk study and field investigation, and fill in any missing gaps. This extensive process resulted in arriving at a well-informed decision that is supported by value chain stakeholders. Based on the above process, the prioritized value chains are:

(a) Fruits and vegetables (tomato, cucurbits, banana, potato)
(b) Livestock and fisheries (pork, milk, fish)
(c) Pulses (lentil, blackgram, pea)
(d) Spices and condiments (ginger, rape and mustard)
(e) Cereals (rice, maize)
(f) Specialty products (*muga*, *eri* silk)

147. Value chain analysis (VCA) and value chain development plan (VCDP): Once the commodities were prioritized, detailed value chain analyses were undertaken for deeper understanding of chain structure and functioning. The VCA focused on: (i) mapping value chains to obtain a clear understanding of the sequence of activities and the key actors and relationships involved in the value chain; (ii) target markets for the particular value chain; (iii) technological capacities of key actors across the value chains; (iv) analyzing the margins and profits within the chain; (v) identifying the constrains that prevent growth of the value chain; and (vi) policy and regulatory framework of the given chain. Based on VCA, the project has prepared detailed VCDP for implementing the upgrading strategy of the prioritized value chains. The VCDP broadly covers the project strategy towards the prioritized value chains in terms of short term and medium term actions, and the investments, skill development, and technical assistance needed.

148. Climate resilient production clusters: This component will support integrated development of climate resilient production clusters of the priority value chains in the project districts. Climate resilient production cluster development will broadly focus following aspects: (i) strengthening the seed systems and adoption of stress-tolerant varieties; (ii) developing and promoting extrapolation domains of suitable cultivars and cropping systems for efficient targeting of technologies in stress-prone areas; (iii) increasing productivity and resource use efficiencies by climate smart inputs; and (iv) improved post-harvest management, value addition and marketing of produce. These interventions in climate resilient production clusters would be supplemented by information and advisory support in technical areas, market trends and intelligence, and weather-related information services. The project has identified climate resilient production clusters in the project districts and is in the process of geo-spatial mapping these clusters. Component C investments support the development of farm focused production clusters of the prioritized value chains.

149. The project adopts a geographically targeted approach to support cluster development, not necessarily limited to a single value chain, as this will be a very constraining factor. The production clusters and agri enterprise clusters (developed under Components A and B) are inherently linked since proximity to production provenance is useful for increasing the chances of successfully developing agri enterprise clusters. The production clusters were identified first and then enterprise clusters in the same project districts were mapped with the objectives on the production side of increasing marketable surplus and on the enterprise side of increasing uptake from production clusters and enhancing value added in those commodities. This resulted in these two clusters being located adjacent to each other, in the process reducing 'road miles' between production and enterprise clusters

Sub-Component C1: Promoting climate resilient technologies and their adoption

150. The objective of this sub-component is to support sustainable increase in production and productivity of the priority value chains, and promote the adoption of climate resilient solutions. This would be done by geographically targeted approach for the integrated development of these value chains and will make key investments in the production clusters of prioritized value chains.

Sub-Component C1.1: Horticulture, crop, spices and condiments value chains

151. For achieving the large agribusiness development and rural transformation objective, the project has identified priority commodity value-chains in Assam which offer promising prospects for economic growth and poverty reduction. The project will support integrated development of climate resilient production clusters of the selected horticulture, crop, spice and condiment value chains in the project districts. Cluster development will broadly focus on two aspects: (i) increasing productivity of the commodity in the identified blocks by technological inputs, and (ii) improved post-harvest management, value addition and marketing of produce by setting up farmer common service centers (CSCs). Service providers will be hired for mobilizing cluster level farmer commodity groups and federating them into larger farmer producer organizations (FPOs). Framer producer organizations will be the focal points for dissemination of improved technologies.

152. Selection of value chain commodities: Rice, maize, mustard, banana, vegetables (brinjal, cauliflower, cabbage, tomato, potato, pumpkin), spices (ginger) and pulses (black gram, lentil, pea) are taken in to consideration for APART based on area and production in the project districts. Rice being the predominant crop covering 61% of the total gross cropped area and rice shelling being the main agro-processing industry (60% of total industrial units) has been selected and taken as one important commodity in all APART plotted production blocks.

153. Selection of production areas: The production clusters on agriculture and horticulture commodities are selected by selecting the top 5 districts and top 5 blocks within each district with an area above 50 ha covering the entire block. Districts which did not come into this selection process, the commodity having more than 50 ha. area coverage in the blocks is selected. Thus, 95 blocks (clusters) have been selected for APART activities for agriculture and horticulture commodities (including special rice), but excluding sali or boro rice. Since rice is the predominant crop of the state, hence rice (both sali and boro) will be taken as one commodity in all 150 APART plotted production blocks (clusters). The list of proposed production clusters (Agriculture and Horticulture) to be covered under the project is given in *Annex.C1.1 (a)* and the corresponding spread is at *Annex.C1.1(b).*

154. Key Constraints Identified from Value chain analysis: State level value chain analysis of rice, maize, pulses, mustard, vegetables, ginger and banana has been carried out and is provided in *Annexe C.1.1 (c).* As such the present value chains of these commodities are long, disjointed and inefficient with several weak links and pain points. The key generic constraints are summarized below:

(a) **Poor quality, high price and unavailability of inputs**:

(i) Limited availability of quality seeds and planting materials is a key constraint. Lack of proper plan and infrastructure for producing sufficient quantity of certified seed of [paddy and other crops compel the farmers to use their own seeds of stage 1,2,3 and 4 reducing potential production. Same is the case with other cereals, pulses, oil seeds and horticulture planting materials.

There is now wide range of variation in climate and has significant impacts on production losses. Researches to evolve climate resilient varieties and technology to meet the weather and temperature fluctuations in respect of crop production have not been sufficient.

(ii) The seeds or planting materials are not readily available to farmers at right time and, if available, the price is very high as compared to other parts of the country. Seed is the major cost (15-20%) in production cost just after labour. A good quality seed of private companies costs around Rs. 180 per Kg. The cost of Govt. sector seeds is low but quality is often poor. Major reason for majority market share of private seed companies is not only quality but also making the seed available at the right time. Govt. seed in many cases is made available late in the sowing season.

(iii) Similar situation is observed in case of fertilizer and agro-chemicals. Generally, no big input dealer or input supplier is present in the production locality; most of the input dealers in the production clusters are small time retailers and get their supplies from large distributors and not directly from the company except in case of IFFCO which supplies fertilizers directly to cooperative societies.

(iv) Another major constraint faced by agri. input dealers is the lack of capital for expanding the business by scaling up the operations/volumes at the same place or opening an extension counter in another place. The prospectus of banks offering credit to input dealers is not very promising. For minimizing defaults in loan recovery the banks are very reluctant to advance credit and pose a number of procedural requirements in financing the agri input dealers,

(b) **Weak adoption and inadequacy of package of practices for the producers:**

i) Although Assam Agriculture University has published Packages of Practices (PoPs) the farmers do not adopt majority and critical components of PoP such as use of seeds recommended varieties/hybrids of crops and crop production and protection practices.

ii) Due to weak research-extension-farmer linkages adoption of PoP by farmers is very low.

iii) Some of the information in PoPs, which are not regularly updated, is very old and is grossly inadequate for modernising agriculture in Assam.

iv) Post harvest management practices are inadequate in PoP.

v) Value addition measures to crop produce are absent in PoP.

vi) Doubling of fertilizer dose in irrigated conditions is mechanically recommended and does not convince the farmers.

vii) From the value chain analysis of a few commodities, it has been established that the existing PoP of AAU is not adequate for present day context and there are many lacunae in the PoP for Kharif and Rabi crops as well as for fish production.

viii) Recent developments in production technology of crops have not been included in the PoP. New varieties/hybrids and agro chemicals have been developed by national and international organizations and private sector which can be used by farmers of Assam for increasing productivity. Except a few, majority of the new varieties or agro-chemicals have not been included in the PoP.

ix) Climate resilient production technology, post harvest management practices, value addition measures are not found in PoP, as a result productivity of the crop goes below the expectation.

(c) **Lack of post harvest management and value addition at farm level**:

i) In Assam, the farmers are mostly of low income category. There is more post harvest loss in traditional method used by farmers than mechanized post harvest chain. In traditional harvesting, food quality depends upon good weather conditions. Their production practices are poor and lack in management decisions, transportation facilities, grading issues, infrastructure and availability of financial markets. They have little knowledge of consumer preferences/attitudes. Their organizational set-up is poor and incurs more loss in every stage of post harvest chain from the field to final retail market. If post harvest management can be mechanized using a collective platform, it will be practicable for more efficient farming systems, better transport, better management, storage and processing facilities which will ensure a larger proportion of harvested output to deliver to market.

ii) Attention also needs to be given to measures for value addition from the farm to the consumer chain. Value addition of crop produce not only reflects an increase in income, but it also reflects a more judicious use of our limited perishable food produce. 'Quality attributes' in the food have special demand for the wealthier group of consumers and necessary chain will be developed. Packaging of processed products is affected by numerous biological and technological factors. Present status of supply chain has no standards for packaging materials resulting in speedy spoilage.

iii) Spoilage of crop produce is particularly serious in Assam due to higher rainfall and moisture content. Drying is the second important component of the post harvest food chain. Farmers mostly are not aware of the exact moisture percentage required for safe and prolonged storage though drying methods have been used by them since centuries. Mechanization in drying is a welcome step and solar or electric dehydrator can greatly speed the drying process apart from usual sun drying, air drying etc. Farmers will be trained for learning all sorts of drying methods to prevent the growth of bacteria, yeast and moulds in the food. Farmers are using outdated storage containers of less effective material contributing high moisture and temperature which are favourable for faster biological deterioration. Most of the small and marginal farmers cannot reach the consumer of larger distance. Here incidence of loss significantly increases in case of perishable produce. The two critical stages i.e. harvesting and transportation need to be looked into either by reducing the distance to markets or by using climate controlled transportation particularly in case of fruits and vegetables

iv) Poor linkages between the crop value chains and livestock value chains: A large amount of crop produce (eg. Maize), crops residues and wastes can feed into livestock sector particularly for feeding. This linkage has sparse in Assam. The project would address this challenge through the commodity cluster mapping exercise and then appropriately aligning the cluster interventions.

(d) **Poor access to markets and weak farmer-market-processor-consumer linkages dominated by middlemen**: In Assam, little emphasis has been laid on production of processed food for value addition and access to domestic and international markets.

i) There is lack of marketing intelligence due to poor education level of the farmers.

ii) There is lack of organized collective platform to go for high cost and scientific/mechanized cultivation, and post harvest managerial ability for direct linkage to markets and consumers eliminating the middlemen who take away a considerable profit from farmer produce.

iii) Poor road conditions, limited transport facilities and long transport distance compel farmers to sell their produce at lower price and also the poor road conditions and limited transport facilities are playing poor role in influencing the magnitude of market access. Research has been confined so far on production of crops only and it has not yet focused on critical stages of food supply chain i.e. harvesting, food storage, processing, packaging and sales.

iv) State extension system consisting of Departments of Agriculture and Horticulture and other relevant state level entities has not been geared to train the farmers in marketing and the changing state, regional, national and global change scenario of agriculture commodities, commercialization of agriculture and adaptation to climate change.

v) Farmers have not been taught about sales knowledge, price discovery, selection of buyers, on-farm and off-farm storage, processing, transport, loading, unloading, packaging and bagging, grading, sorting, drying, threshing, harvesting apart from production in entire value chain activities.

155. Strategy to address identified constraints in value chains: The key elements of the strategy to address the identified constraints include-

a) Strengthening seed systems for rice and self pollinated crops, production of tissue culture banana seedlings of varieties preferred by trade, improved methods of producing disease-free seedlings of vegetables, etc.

b) To meet the quality paddy seed requirement of the farming community, proper planning and time bound program will be evolved. Mere giving indent to seed supplying agencies 3-6 months before sowing time does not serve purpose. Indent for particular breeder seeds will be placed to research stations and Indian Institute of Rice Research, Hyderabad and these will be multiplied in Govt./Semi-Govt. farms to get foundation seeds.

c) Expertise of International Rice Research Institute (IRRI) will be used for modernizing paddy seed system in Assam and promoting modern and climate resilient paddy production and processing practices.

d) For producing tissue-culture banana planting preferred by trade, AAU will strengthen its capacity for producing tissue culture banana and supplying it to farmers on cost recovery basis.

e) For vegetables, the project will promote cultivation of private sector varieties and hybrids preferred by vegetable growers.

f) The project will support development of commercial vegetable nurseries. The expertise of World Vegetable Centre (WVC) will be used for this purpose.

g) Revised and updated Packages of Practices for Kharif Crops, Rabi Crops and Fisheries is being prepared by AAU which will include climate resilient technology. The revised PoPs are expected to be attractive, simple, usable and understandable by the Assam farmers and fishermen.

h) Demonstrations will be organized covering all aspects from crop production to harvesting by the concerned ATMAs.

i) Farmers will be well trained in mechanized harvesting, threshing, cleaning, winnowing, drying, storage, processing and transportation on a co-operative platform.

j) Trainings will be imparted to input suppliers, traders of the crop produce in the present changing scenario of market to update their knowledge of trade efficiency of input and output flow. An efficient interconnectivity among them is essential for agri-business activities of the project.

k) Farmers shall be trained on commercial production of selected commodities with improved and climate resilient technology.

l) For improving access to institutional credit Kissan Credit Card awareness camps will be organized for farmers in cooperation with the banks. This activity will be linked with subcomponent C3.

m) Farmers will be educated about the benefits of storing surplus agriculture produce in warehouse to prevent distress sale during market gluts and accessing credit through warehouse receipts.

n) Farmers, traders and transporters will be trained on food safety issues.

o) Farmers will be organized in commodity interest groups, FPOs and FPCs; and these will be used as focal points for technology dissemination activities through demonstrations, farmer trainings and exposure visits. As the farmers are mostly small and marginal having lower level of education, their organization on a common platform is indispensible for high cost mechanized cultivation, post harvest management and Agri-business activities.

p) Farmer Producers Organizations (FPOs) and Common Service Centers (CSCs) will be the platform through which technology dissemination, product aggregation, finance linkages, Agro-Business linkage; Agro-Business strategies will be operationalized

156. Setting up CSCs for post harvest management, cleaning, grading sorting etc.: As improved post harvest management involves so many high cost infrastructures, Common Service Centers (CSCs) are the only solution. Mechanization in harvesting, threshing, cleaning/winnowing, drying, storage, transportation, packaging etc. at farm level demands investment and decision making and these will be smoothly performed through CSCs. Food storage is important component on post harvest management where deterioration of food has to be protected from insects, moulds, bacteria, rats, birds etc. Moisture and temperature management are the key factors to prevent the stored food from spoilage and shrinkage. Improper handling may also result negativities. Processing and proper packaging are possible only through CSCs. Sales at the right time, bulk sales, retail sales etc. require decision making and FPOs will be trained to best manage them.

157. Improving input supplies through development of Enterprise Clusters (Clusters (Details in Component A and B Description): As APART activities will simultaneously be in operation in 16 districts, few input supplying agencies cannot fulfil the diverse requirement in big volume. Moreover the procedure, regulation are the same for all. Therefore, existing input suppliers and newly developed input suppliers will be encouraged to establish the new enterprise in production clusters for agriculture and horticulture sector. To have a better linkage between farmers and input dealers and to make the inputs easily available to farmers interactive session between farmers input dealers will be organized in all project districts.

Improving market infrastructure (Details in Component B Description): With the improvement in transport and communication system, the food produced viz. paddy, vegetables, fruits etc. are regularly transported to the states outside Assam, mostly to North-East and Northern India. The markets in Assam are not well structured and have many problems for marketing. Therefore; the market infrastructures are to be improved under APART to improve the marketing of produces in Assam.

158. Description of sub-component interventions: The value chain development plans *[Annex C1.1 (c)],* implemented by the district Agricultural Technology Management Agencies (ATMAs), Departments of Agriculture and Horticulture and Assam Agricultural University (AAU) in collaboration with International Rice Research Institute (IRRI) and World Vegetable Center (WVC) and private sector partners, will focus on: (i) increasing productivity of identified field and horticultural crops, (ii) promoting diversification to pulses, oilseeds, maize, banana and vegetables, and (iii) improving quality of produce. Intensification and diversification of crop-horticulture production system will lead to higher farm incomes and reduced vulnerability to external shocks such as weather and price volatility. The first phase of project (project years 1-3) will cover about 65,000 ha, the second (project years 3-4) and third (project years 5-6) phase will expand the coverage to another 70,000 ha and 65,000 ha respectively.

159. Institutional Strengthening:

(a) ***Manpower Support****:* Agricultural Technology Management Agencies (ATMAs) will be strengthened to deliver market driven and climate resilient agricultural support services to the farming communities, covering production, post-harvest management and marketing of the identified commodities covering crop, horticulture, livestock and fish sub-sectors. For augmenting marketing and agribusiness capacity of ATMAs, project will support hiring of two "Agricultural Marketing Experts (AME)" in each district and four support staff in areas of financial management, procurement and computer support. Essential qualifications and experience for AME are given below.

- **Educational Qualifications:** Agricultural Marketing Expert (AME) must possess a Post-Graduate degree in Agriculture/ Horticulture with MBA in Marketing/ Marketing & Human Resource Management/PGD in Agri-Business Management/ PGD in Marketing or Agri-Business Management/related field from any recognized university/approved Institutions.
- **Working Experience:** A minimum of 5 years of professional experience in Agricultural Marketing, Agribusiness and Value Chain Development, specifically in the development of market linkages and working experience in the establishment of Agriculture/ Horticulture based institutions and operations of marketing enterprises by farmer organization, entrepreneur.
- **Computer Skills:** The district Agricultural Marketing Expert (AME) must have proven experience of using internet based applications, using and working with advanced word processing/spreadsheet including MS Word, MS Excel and MS Power Point and other related applications.

For smooth implementation of the project activities of agriculture and allied sector, 4 supporting staffs such as one procurement Assistant, one Accountant, one Computer operator and one Office Assistant will be provided to each district ATMA. There will be 64 supporting staffs covering all sixteen project districts and total cost will be around Rs. 1613.00 Lakh for seven years

(b) ***Need based infrastructure support will be provided for improving ATMA***: offices at district level and block level Farmer Information and Advisory Centers (FIACs) and setting up ICT-based platform for agro-advisories and value chain services. FIAC is the platform to bring together all the block level officers of Agriculture and allied sector under one roof and to involve the farmers to discuss their problems and to prepare the need based plan to overcome the problems of agriculture and allied sector. As the farmers are involved in planning and decision making process from block level onwards, hence the farmers' problems can be properly addressed. In the modern days of information technology, the FIACs will be equipped with all necessary ICT based facilities to have a quick response and solutions to the farmers' problems on Agriculture and allied sector. The free of cost Agro-advisories could be provided to the farmers from FIAC with the help of AAU and other such type of institutes. Total 16 district ATMA offices will be renovated and provided with required infrastructure support with required materials/equipments etc. The total cost will be around Rs. 160.00 lakh @ Rs. 10.00 Lakh per district as briefed below

Sl.	Item	Unit/Qty.	Unit cost(Rs.)	Cost (Rs. In Lakh)	Remarks
1	Civil Works	1	7	7	--
2	Computer with accessories	2	0.7	1.4	2 Computers per district (ATMA)
3	Photocopier	1	1.25	1.25	1 Photocopier
4	Furniture(Table, Chair, Almirah etc.)	LS	0.35	0.35	
	Total			**10**	

Note: Block level FIAC/ {earlier Block Resource Centre (BRC)} will be renovated and required infrastructure support and other materials/equipments will be provided to 60 FIAC/{earlier Block

Resource Centre(BRC)} which were constructed during early part of AACP. The total cost will be around Rs. 300.00 Lakh @ Rs. 5.00 per FIAC

160. Promoting climate resilient agriculture: In the face of increasing climate change, threats and changing market demand for agricultural commodities, this sub-component will promote climate-resilient and sustainable crop-horticulture production systems around the identified commodities. The climate change action plan of the state predicts increasing incidence of short spells of extreme precipitation and surge in flash floods, and intermittent long dry spells during monsoon. These changes in rainfall pattern will result in increased water requirements for crops in general and paddy in particular. Additionally, the low lying areas under paddy may be submerged for longer duration, leading to decreased yield or crop failure. The increasing unseasonal high winds may lead to lodging in banana, maize and to some degree, in medium and tall paddy varieties. The AAU, WVC and Departments of Horticulture and Agriculture will promote cultivation of short duration legumes (blackgram, lentil, pea) in Summer/Rabi season which are harvested before onset of monsoon rains, improved methods of vegetable cultivation in high rainfall areas, setting up vegetable nurseries for production of disease-free seedlings, and low cost protected cultivation of vegetables.

Similarly, AAU will work with IRRI and Department of Agriculture to identify and validate cultivation of climate resilient, stress tolerant paddy varieties (*sub 1 gene or scuba gene*), alternately wetting and drying paddy culture, and other improved management for rice cultivation including direct seeding. Web-based decision support system (e.g. 'Crop Manager for Rice" based system (http://cropmanager.irri.org)') for field-specific recommendations and matching best management practices developed by IRRI and other partner organizations will be operationalized in the clusters. Special attention will be paid to strengthen seed system for the prioritized value chains. Production of specialty rice (e.g. scented, sticky, colored rice) and other commodities (e.g. *bhut jalokia* or king chilli etc.) will be taken up in selected clusters. The project will also pilot remote sensing – GIS tools and agro-meteorology - to improve climate resilience. Crop diversification will be achieved by increasing area under maize, rape & mustard, pulses vegetables and other high value commodities.

Building on the state level value chain analysis of the commodities which has already been completed and described in detail above, district level Value Chain Action Plans (VCAPs) for the selected commodities will be prepared and implemented by the ATMAs in collaboration with Departments of Agriculture and Horticulture and AAU with technical backstopping by IRRI and WVC. The thrust of district VCAPs will be specifically on what is to be done, where, when and by whom. In order to take advantage of the emerging market opportunities, the focus of VCAPs will be on increasing production of specific varieties/types for which there is market demand.

161. Updating package of practices: Packages of Practices (PoP) for Kharif, Rabi and Horticultural crops and Fisheries will be updated and simplified by AAU to comprehensively address all aspects of production from land preparation to marketing of the produce, including good climate resilient agriculture practices. The revised PoPs will not include use of pesticides banned by Government of India and World Health Organization. The IPM protocols for different crops will be included, wherever possible. The target audience for the revised PoP should be farmers.

162. Productivity enhancement of priority commodities: The planned interventions for increasing productivity of the identified commodities are described below. This list is only indicative and will be appropriately modified during implementation **–**

- **Strengthening of seed system for speciality rice, maize, pulses, oilseeds and potato:** Adequate access of the farmers to the basic inputs of improved agriculture practices, particularly, quality seeds and planting materials and percolation of improved production technology to the farmers

are considered to be the most important factors for agricultural growth in the state of Assam. In view of this, the University has been showcasing its improved production technologies in compact large blocks to effectively demonstrate to the farmers the worth of its improved crop varieties and production technologies and also to produce in the farmers' fields' large quantity of quality seeds of the major crops, particularly, rice, pulses and oilseeds with farmers' participation. This programme has helped in sensitizing the farmers about the importance of quality seeds and also to train at least a section of farmers to produce and process quality seeds of corps. Therefore, it is proposed to carry out participatory seed production programme particularly for stress tolerant rice varieties, specialty rice, potato, pulses and oilseeds so that the seed system could be sustained. Details *annexed at C1.1 (d).*

- **Commodity wise interventions**

(a) **Rice:** Agriculture of Assam is primarily rice centric with rice covering more than 60 per cent of the gross cropped area of about 41 lakh ha. The Department of Agriculture will make all out efforts for productivity enhancement of rice by promoting use of stress tolerant, high yielding, pest-tolerant and short duration improved varieties/hybrids and appropriate production and protection practices, including raising of healthy seedlings, timely transplanting and proper plant population, weed control, balanced nutrition, application of zinc and other nutrients. The Deptt. will also operationalize in the target rice clusters Web-based decision support system 'Crop Manager for Rice based system (http://cropmanager.irri.org)' for field-specific recommendations and matching best management practices developed by IRRI. Special attention will be paid to strengthen seed system for rice.

The AAU/IRRI will also undertake on-farm evaluation and demonstration of promising lines and production-protection practices of stress tolerant rice varieties Swarna Sub1, Ranjit Sub1, Bahadur Sub1, Sahbhagidhan etc., speciality rices like Bora, Joha, red rice in the identified blocks. In this line to sustain the seed system, the university will conduct participatory seed production programme covering an area of 2450 ha with an estimated cost of Rs. 784.0 Lakh.

(b) **Maize, mustard and pulses**: The Department of Agriculture will attempt to achieve crop diversification by increasing area under maize, mustard and pulses (irrigated blackgram, greengram, lentil and pea) during Rabi season. At present, production in Assam is grossly inadequate to meet the demand for these commodities. Average productivity is less than 50% of the potential. The water requirement of these crops is very low as compared with Boro paddy. In addition, pulses improve soil fertility by fixing atmospheric nitrogen, reducing fertilizer nitrogen requirements. Focus of crop diversification will be on introducing high yielding and short duration varieties/hybrids of pulses, mustard and maize, line sowing, provision of watering at critical stage of crop growth, introduction of integrated pest, nutrient and weed management, and improving seed replacement rate. The department will organize altogether 6200 on-farm demonstrations of which 2000 in maize, 2200 in pulses and 2000 will be in rape & mustard.

The University will organize adaptive and demonstration trials on new varieties like Beki (SB 27-3), Kolong (SB 25-19), Sonkush (SB 23-5) etc in blackgram, Axom Masur 1 (SL 2-24), Axom Masur 2(SL 2-28) etc in lentil and JT 90-1 (Jeuti), TS 67 etc in rapeseed & mustard and FP-255 etc in pea and improved crop production technologies of these crops.

The university will also conduct OFTs with the varieties and technologies that are in the pipeline of recommendation and also those which are in the advanced stage of development. The university will take up participatory seed production on pulses and oilseeds in the crops viz. rape and mustard, lentil , pea in an area of 1960 ha during the entire project period involving an estimated cost of Rs.568.40 Lakh.

(c) **Vegetables:** The Northeast India including Assam is considered suitable for growing wide range of horticultural crops due to its vast physiographic and agro-climatic variation, abundant rainfall,

fertile soil, rich genetic resource base and diverse production systems. Despite the region's well-recognized potential for horticulture its share to the national production is rather insignificant. In Assam, the fruits and vegetables account for about 10 per cent of the total cropped area. Though the area and production of horticultural crops in Assam have been increasing, there has not been significant change in the productivity during the past several years warranting care for growth of the sector. In this project, focus of vegetable production will be concentrated on promoting cultivation of high yielding varieties/hybrids, production of disease-free seedlings and improved agronomic practices of commonly cultivated vegetables like tomato, cucurbits/gourds, beans, cabbage, cauliflower, chilli, brinjal, etc.

The main thrust will be on promoting cultivation of hybrids and varieties developed by the private sector which are popular among vegetable growers in the production clusters. Special attention will be given to promote the use of safe pesticides and methods of application to minimize pesticide load in vegetable produce. Some villages in vegetable clusters will be developed as IPM villages. The Department of Agriculture and Horticulture will organize around 5000 demonstrations on vegetable crops.

The AAU will conduct about 1000 on-farm trials to evaluate the newly developed varieties and production technologies for vegetable crops with a financial involvement of Rs. 70.00 Lakh.

Vegetable nurseries: Progressive vegetable growers will be supported, on matching grant basis, to set up nurseries to supply healthy seedlings to other farmers in the village. In this regard, project will provide grant to 50 nurseries by individual farmers covering all project districts on cost sharing basis. The minimum cost of expanding an existing nursery or setting up a new nursery will be Rs 2.00 lakh/per nursery and could be higher. The project support will be 50% of the total cost limited to Rs 1.00 lakh per nursery and the beneficiary share will be 50 %.

The criteria for selection of nursery growers for financial assistance, procedure for setting up nurseries and releasing project support under APART will be as under:

- The applicant should have certificate of nurserymen training from AAU.
- Support will be available for modernizing or expanding an existing vegetable nursery.
- The area of the nursery should be a minimum of 1 bigha (0.13 ha) for raising of vegetable seedlings.
- The applicant will submit a detailed proposal along with DPR to Project Director (PD) ATMA. The proposal should include, among other aspects, setting up shade nets for protected production of disease free seedlings, and annual action plan which should include vegetable crop wise production of vegetable seedlings.
- The proposal will be submitted to PD, ATMA. The selection will be made by PD, ATMA based on quality and relevance of the proposal for setting up.
- After approval by ATMA, first the selected nursery grower will spend his entire share of cash contribution for setting up or expanding the nursery.
- After verification by Agriculture Development Officer, the project share will be released by PD, ATMA as back ended grant/subsidy.

Other aspects of vegetable production

- Detailed agreement would be signed with World Vegetable Centre on germplasm exchange, field trials etc. and introduction of elite planting material into the state. At the same time

strengthening and capacity building of Directorate of Horticulture and Food Processing will be taken up in an intensive manner as it has been established in 2015 only.

- Shifting dates of sowing and information on suitable early and late sown varieties will be a part of farmer trainings. It will also be ensured that these early/late sown varieties will be available at the time of sowing.
- Low cost protected cultivation of vegetables during rainy season by farmers will be encouraged (support of World Vegetable Centre will be sought on this). Supply of fresh vegetables in residential colonies on twice a week basis by producers of FPOs will also be explored (This will be under subcomponent C2). This may work in bigger towns (clusters near Distt. HQ) where most households have working couples.
- In order to promote integrated pest management (IPM) in vegetable production through area wide approach, IPM villages will be developed in vegetable clusters.
- Since Assam has a comparative advantage in supplying vegetables to Delhi, Haryana, Punjab and Rajasthan from January to March, special attention will be paid for cultivation of vegetables after the withdrawal of monsoons for capturing these markets. This may require refinement of production practices for maximizing productivity.

(d) **Banana:** This project will aim at tapping the potential of banana with substantial increase in production via area expansion and productivity increase and linkage to the post-harvest management and marketing. For rapid growth, emphasis will be on promotion of healthy planting materials among the farmers. Micro-propagation is preferred over conventional method of propagation owing to its faster multiplication rate, ease of transport, uniformity in planting materials and production of disease-free seedlings. Though the banana tissue culture industry has developed considerably across the nation, it is still in very nascent state in the North-East India to meet the fast growing demand. AAU will undertake a Market Research study to identify banana varieties preferred by the market (traders, commission agents, aggregators, procurement agencies, farmers, consumers, etc.). The Market Research study will be done by the Agriculture Economics and Farm Management Department of AAU.

The AAU already has a moderate facility to meet very small part of the demand in Assam. Considering the demand, it has become urgent to upgrade and expand the existing facility to meet the demand of tissue culture banana samplings. Commercial Tissue Culture Lab (CTL) at Assam Agricultural University, Jorhat has already standardized the protocol for micro-propagation of different cultivars and is producing about 50,000 tissue culture banana plantlets per annum. To scale up the present production from fifty thousand to about 10 lakhs plantlets, the exiting commercial tissue culture lab needs to be strengthened with semi-automation using partially filled bioreactors to meet the banana seedling demands. A feasibility study on the tissue culture banana in Assam will be carried out in the first year of the project. An independent stand-alone “Revolving Fund for Tissue Culture Banana” scheme will be prepared and operationalized by AAU. The tissue culture banana will be supplied to farmers on cost recovery basis for sustaining tissue culture banana plantlets. The details are given in *Annex C1.1(e).*

The Department of Agriculture will organize demonstrations on recommended package of practices, bunch covering and propping practices in banana. Staggered planting will also be followed through demonstrations to catch the markets during peak demand periods once in April/May and another during September/October. The total nos. of demonstrations to be organized on banana crop will be around 600.

The university will take up 36 numbers On-farm trial on tissue culture banana on high density planting with an estimated cost of around 11.0 Lakh.

(e) **Potato**: Introduction of certified stage-I potatoes from Punjab will be followed and its multiplication will be done for at least one or two generations and will be used for seed purpose. As the rate of degeneration is very high, hence seed production will be restricted to second generation only. Seed production is to be followed in clusters having facilities of cold-storage. Varieties like Kufri Pokhraj, K. Himalini etc. need to be popularized. Processed potato variety like Chipsona will be introduced to meet the demand of chips industry. Potato seed village programme in selected clusters will also be encouraged. In identified clusters, demonstrations will be done based on modified PoPs. Recommended doses of fertilizers and agro chemicals will be focused along with method of application of fertilizers. Usually flood irrigation is followed by the farmers. . Use of mulching with locally available materials like water hyacinth will be followed which help in preservation of soil moisture. The total nos. of demonstrations to be organized on potato will be around 1200. The University will arrange to collect breeder seed and produce the foundation and certified seeds in participatory mode in 4 districts with access to cold storage with financial involvement of about Rs.235.0 Lakh covering an area of 280 ha.

(f) **Spices: (Ginger):** Strengthening the varietal specific terminal market linkages with Assam Ginger for leveraging quality specific pricing modality while facilitating value addition at source supported by a well integrated logistic network. Value Chain Action Plan for ginger will involve (i) Mapping the entire production baseline of ginger with special focus on varietal attributes, growers preference, market requirement agro climatic suitability and establish the market linked product specification for each variety/grade, (ii) Strengthening the terminal market linkages of Assam Ginger in its fresh form on a varietal specific market segregation approach for leveraging the product value, volume and price realization of all stakeholders, (iii) Promoting entrepreneurs for p-value addition focused on market driven, product specification with strong logistic network targeting product value enhancement, cost reduction and increased returns to the primary producers.

163. Promotion of mechanization and use of improved implements and tools: For enhancement of productivity and production of crops use of farm machineries and equipments has become important particularly in context of crop intensification, diversification and labour shortage. At the same time there are many small and effective farm equipments have come up for small and medium farmers. Hence, it is proposed to popularize these equipments among the farmers through the suitable OFT and FLDs to be carried out by the research stations and KVKs of the selected districts. The detail of the farm equipments to be popularized is given in *Annex C 1.1(f).*

164. Post Harvest Management: Special efforts will be made to promote farm level cleaning, drying, grading and packaging by organizing trainings and post-harvest management demonstrations. This will include, among others, providing the required equipment, implements and tools in project areas and demonstrating their use. The department will organize 150 demonstrations on post harvest management per year from second year onwards covering all project districts. The total cost for this will be around Rs. 135.00 Lakh @ Rs. 0.15 Lakh per demonstration.

165. Innovative Pilots: The project will also support individual farmers on matching grant basis to pilot innovative activities like producing niche commodities, post-harvest management, beekeeping, mushroom production etc. which are not be directly covered by value chain action plans and component C2 activities. For this purpose each district ATMA will be provided an amount of Rs. 4.00 Lakh per year from third year to sixth year. The total cost proposed for this activity will be Rs. 256.00 Lakh.

The cost of individual pilots may vary from say about Rs 40,000 to 2, 00,000. The project support will be limited to 80% of the total cost limited to a maximum of Rs 1, 00,000 per innovative pilot. The beneficiary selection will be approved by PD, ATMA. After approval, first the farmer will spend his entire share of cash contribution. The project share will be released after verification of the work done and

spending of farmer share. The release will be in one instalment if project share is up to Rs. 50,000 and in two equal instalments if the project share is more than Rs 50,000.

The key elements of implementing value chain action plans of the selected commodities and developing production clusters will be mobilization of farmers, organizing on-farm demonstrations, training and capacity building of famers. These are described in the following sections.

166. Mobilization of farmers: Mobilization of farmers will be done by organizing awareness campaigns through various communication aids including pamphlets, posters, individual contact and small group meeting, organizing mass meeting, etc. to sensitize farmers on farmer collectives/ groups. Discussions will be done with farmers/ opinion leaders to (a) understand key issues/ constraints pertaining to production and marketing of produce, (b) disseminate the benefits of a farmer collective/ group to help address these issues and (c) build consensus among the farmers to organize themselves into informal village level farmer collectives / groups. Once the farmers will understand and come forward to form groups, they will be informally recognized as Common Interest Group (CIG)/Farmer Interest Group (FIG) and will start group purchasing of inputs and selling of produce in group. The timeline required for mobilization of farmers will be 0-6 months. The nos. of farmers in a CIG or FIG will be around 20-25 and by federating such 20-25 CIGs/FIGs a large organization called Farmer Producer Organization (FPO) will be formed and within 18 months of formation the organization will be registered under company's act and will be recognized as farmer Producer Company (FPC) to undertake various activities such as marketing of inputs, outputs, value addition activities etc. The entire process of FPO (FPC) formation starting from baseline survey, mobilization, registration, and establishing the organization as successful business entity will be done by Service Providers under the guidance & supervision of ARIAS Society, department of Agriculture & Horticulture and ATMA. (The details are given in subcomponent C.2)

167. On farm demonstrations and adaptive trials: The Department of Agriculture and Horticulture will conduct large number of demonstrations of climate resilient agriculture technologies in relation to the target crops, particularly, rice maize, rape & mustard, pulses and vegetables in the farmers' field with their active participation.

Integrated Crop Management (ICM) demonstrations and related farmer trainings will be the core project activity and the main vehicle for dissemination of improved technologies to farmers. The ICM demonstrations will include the complete package of practices for a particular crop from land preparation to harvesting of the crop (including use of seed of improved high yielding varieties/hybrids, seed treatment, balanced nutrition (including use of organic manures, bio-fertilizers, micronutrients), weed control, integrated pest and disease management (including use of bio-pesticides and bio-rational pesticides) and other crop husbandry practices.

About 22000 nos. of demonstrations will be organized in Agri. & Horti. sector by the respective departments with an unit size of 0.25 ha and average unit cost for the demonstration will be Rs. 0.20 Lakh including farmer trainings and field days linked with the demonstration plot. The nos. of demonstration and unit cost may increase based on district level VCAPs of various commodities to be prepared by District ATMAs. Crop wise and year-wise number of demonstrations to be organized will be included in VCAPs. The estimated cost for the demonstration will be Rs. 4400.00 Lakh. The income accrued to the demo farmers by selling produce of the demo plots will be considered additional benefit to the farmers. In addition to the criteria for selecting the farmer on whose farm the demonstration will be organized and guidelines for organizing demonstrations *[Annex C1.1(g)],* ATMAs and Departments of Agriculture will select women famers wherever possible.

Most of the demonstrations will be on the selected crops focusing on popularizing high payoff interventions and reducing carbon and water foot print of the production systems, including popularizing resource conservation technologies (e.g., zero tillage) and climate smart agricultural practices like integrated soil fertility management. Post-harvest management demonstrations will promote farm level drying, cleaning, grading, packing and value addition. A broad menu of interventions for agriculture demonstrations will be developed for different commodities. High payoff interventions will be selected from this menu depending upon agro-ecological conditions and emerging marketing opportunities in a particular cluster.

Agriculture department will also organize demonstrations on fodders to boost the dairy farming in Assam. About 2112 fodder demonstrations will be organized and total cost will be around Rs.317.00 Lakh @ Rs. 0.15 Lakh per demonstration. Besides fodder demonstrations, manual chaff cutter will be provided to dairy farmers on cost sharing basis. Total 1056 chaff cutters will be distributed among dairy farmers and cost will be around Rs. 158.40 Lakh @ Rs. 0.15 Lakh per chaff cutter. Beneficiaries' contribution will be around 20 %.

Moreover, both these two departments (Horticulture and Agriculture) will organize demonstration on Integrated Pest Management (IPM) technology especially on vegetables crops at cluster level. There will be 30 demonstrations in each year from second year onwards and size of the demonstration unit will vary according to the IPM package to be adopted in the demonstration. About 180 IPM demonstrations will be organized during the project period and unit cost will be Rs. 1.50 Lakh per demonstration. The total cost will be around Rs. 270.00 Lakh.

Farmer trainings related with on-farm demonstrations: There will be two training sessions linked with on-farm demonstration – one before the sowing/planting of the crops and the second during growth stage of crop. About 20 farmers (including 5 women farmers) will be linked with each demonstration plot for these trainings. The training sessions will cover all aspects of production of that crop from land preparation to harvesting.

Field days: For disseminating improved technologies to a large number of farmers in the project villages, field days will be an integral part of on-farm demonstrations. Field day will be organized near the harvesting stage of the crop so that farmers can see the difference between the farmer practice and the recommended package of practices for that crop as demonstrated in the plot.

Adoption of demonstrated technologies: Adoption of demonstrated technologies by the farmers in the years following the year in which demonstrations are organized will be systematically tracked and documented. This will include number of adopter farmers, area covered and gains in productivity achieved as a result of adoption of project interventions. In view of the importance of seed in increasing crop productivity and the low seed replacement rate in Assam, special attention will be paid to technology empowerment of farmers for producing quality seed of self-pollinated crops. Project investments will also include promotion of improved farm implements like seed-cum-fertilizer drills, zero tillage seed drills, tillers and sprayers.

Most of the demonstrations will be organized by the respective departments and ATMA field staff, and other agencies like private sector companies used by IRRI. Some adaptive research trials (on-farm trials) and front line demonstrations will also be organized by AAU through its KVKs and RARSs. The University will conduct about 2100 OFTs and 1500 frontline demonstrations (FLDs) with an estimated cost of around Rs.145.00 and Rs. 268.00 Lakh, respectively The details of the OFT and frontline demonstrations are given in *Annex C1.1 (h,i)* Detailed guidelines for organizing and monitoring demonstrations and tracking adoption rates are given in *Annex –C1.1(g).*

The university will also take up some demonstration programme on fishery technology in the farmers' field covering 550 numbers in the entire project period with an estimated cost of Rs.220.00 Lakh in the project districts

168. Training, Capacity Building & Exposure Visits: Trainings and capacity building activities covering various aspects of production, post-harvest management and marketing of crops and fisheries will be organized for ATMA and line department staffs, farmers, inputs suppliers and traders by AAU. If required, experts from outside will be taken for providing trainings. Since ARIAS will hire an agency for providing training on various aspects, the trainings which cannot be done by AAU will be done through that agency. The university will prepare detailed training modules covering various aspects of training such as market driven extension, access to credit, warehouse, good agricultural practice, agricultural marketing channels, post-harvest management, storage of surplus grains in accredited warehouses of ASWHC supported by the project etc. There will be different training modules, including an Orientation Programme to sensitize the project staff of ATMAs and line departments about various aspects of APART, capacity building and training for Block Technical Managers (BTMs) and Assistant Technical Managers (ATMs) and district ATMAs, and line department (Agriculture, Horticulture, Fisheries) staff covering all aspects, including production, post-harvest management, marketing, agri-business development, CIGs, FPOs, FPCs, CSCs, etc. Another important area for trainings (for farmers and project staff) is access to institutional credit like KCC, Cash Credit Limit, negotiable warehouse receipts, etc. The detailed training modules along with the tentative calendar will be prepared by AAU *[tentative list at annex C1.1(j)]* in consultation with PCU and PIUs, and submitted for Bank review. In view of the skill gap in AAU in the areas of post-harvest management, marketing, and agribusiness; and setting up FPOs and CSCs and private sector development, the AAU will hire a well qualified professional covering these areas, and use him for training programs and technical backstopping of AAU and line department APART teams.

About 745 Kisan Credit Card (KCC) awareness camp will be organised during the project period @ 149 camps per year from first year to fifth year. The total cost will be around Rs.89.40 Lakh @ Rs. 0.12 Lakh per year.

Training on good agricultural practices (GAP) will be organised to develop the skill of farmers on best practices for obtaining higher return in agriculture sector. There will be 480 trainings on good agricultural practices during the project period @ 80 trainings per year from second year to seventh year and total cost will be around Rs. 72.00 Lakh @ Rs. 0.15 Lakh per training.

The department (both agriculture and horticulture) will also organise training and awareness camps for the farmers to increase the warehouse receipt. For these 160 trainings cum awareness camps will be organised @ 32 camps/trainings per year from third to seventh year and total cost will be around Rs. 24.00 Lakh @ Rs. 0.15 Lakh per training/camp.

The training and capacity building programme to be taken up university will involve an estimated cost of Rs. 392.00 Lakh for agriculture, horticulture and fisheries.

The World Vegetable Centre will assist the newly established Department of Horticulture in adopting modern operational modalities and tools for giving a big push to vegetable production in Assam.

169. Exposure visit is one important extension tools to reinforce the confidence of the farmers, officers in new technology, methods etc. Since "seeing is believing", exposure visit of farmers, extension functionaries and university scientists will be organized to reputed national and international organizations, farmers' fields, research stations etc. to have a better knowledge on technology, methods etc. and to improve the skills of the farmers, officers and scientists. Exposure visit of farmers will be organized to the areas where the farmers can observe the climate resilient production technology and post harvest management practices. Similarly the exposure visit of officers will be organized to the places

from where the officers can learn climate resilient and market led production technology of the crop including post harvest management and value addition practices. Total 32 exposure visit of farmers will be organized within the state and the nos. of farmers will be 30 in one batch and the total amount will be 16.00 lakh @ Rs.0.50 lakh per batch. Fair representation of farmers producing all focus commodities will be ensured in each batch. Similarly the exposure visit of Officers will be organized to other states of the country and the total 96 officers from Agriculture & Horticulture department will be sent to exposure visit and the total cost will be Rs. 48.00 Lakh @ Rs. 0.50 per person. External training programmes (outside the country) for officers of Agriculture, Horticulture department and AAU will be organised and for this activity lumpsum amount of Rs. 100.00 Lakh is estimated during the project period.

170. Training efficacy assessment: The training courses would be evaluated by trainers and the trainees followed by regular review by top management. Evaluation would be done by the Course Director with a questionnaire having questions related to coverage of content, methodology of training, audio-visual aids quality, accommodation etc. at the end of the course. The trainees would be provided with self addressed post card to make correspondence with the organizing institute. Feedback from concerned department would also be obtained from time to time. Towards the end of the project, an external evaluation is planned by external resource personnel who will assess the impact of the training program.

171. Regional workshops: To implement Component C activities in an integrated manner, share implementation experience and bottlenecks, and to review the progress of the project and annual action plans to be adopted by the project team, the project will organize two zonal level workshops per year in each zone @ Rs. 1.00 lakh per workshop. For this, the project districts will be divided into four zones and accordingly the workshops will be organized in these four zones. The total cost will be Rs. 56.00 Lakh

172. Buyer Seller Meets: In order to develop farmer-market linkages each ATMA will organize buyer-seller meets every year starting from Project Year 2. The modalities for organizing such meets will be developed by PCU. The objective of these district level meets will be to develop linkages between farmers and buyers (traders, processors, commission agents, etc.) and facilitate direct buying from farmers and FPOs wherever possible. In addition to district level buyer-seller meets, one state level buyer-seller meet will be organized every year to attract bigger players and lead farmers under Component A/B. This will also help in getting feedback about the project activities, production and market trends. About 96 buyer-seller meets will be organized during the project period and the total cost will be around Rs. 96.00 Lakh @ Rs. 1.00 Lakh per meet. One buyer seller meet at state level will be organized in association with EDPF every year which will have buyers from country wide. Its details and budget are included in sub-component A-2.

173. Implementation Arrangements:

(a) **Roles and responsibilities of ATMAs:** Since, ATMA will be the main implementing agency for all activities of this subcomponent; hence they will actively coordinate, guide and supervise the Service Provider in all aspects and provide the necessary information & inputs in every step. They will help the Service Provider in baseline survey, mobilization of farmers to form CIG/FIG/FPO etc. ATMA being the main implementing agency of this subcomponent at block level, so the overall responsibilities of implementation of all activities will be laid upon ATMAs. ATMAs role will not only confine to selection of farmers and site for training and demonstration, but also responsible for success of the training and demonstration and overall successful implementation of all the activities

(b) **Roles and responsibilities of AAU**: For effective and time bound implementation of this subcomponent, Assam Agricultural University with support from National Research Centre (NRC) on Pig, IRRI, ILRI, WFC and WVC will have a vital role to play.

AAU will work with IRRI and Department of Agriculture to identify and validate cultivation of climate resilient, stress tolerant paddy varieties (sub 1 gene or scuba gene), intermittently flood irrigated paddy, and other improved management for rice cultivation (including direct seeding, alternate wetting and drying).AAU would extend technical support to the ARIAS Society of the Govt. of Assam during implementation phase of APART with thrust on market-led climate smart intensification of production systems involving the identified agricultural and horticultural commodities and implementation of value chain development plans. Productivity enhancement of the selected agriculture commodities through adoption updated package of practices including new crop varieties and post harvest management practices will be main focus area. This will lead to increased production of the selected field and horticulture crop which ultimately will help in improving the marketable surplus of the commodities necessary for value chain action plan.

The research stations (six in number) located in the selected districts *viz.*, Regional Agricultural Research Station (RARS), Gossaigaon, Titabar, Lakhimpur, Shillongani, Diphu, and Horticultural Research Station (HRS),Kahikuchi (for Goalpara district) and fifteen Krishi Vigyan Kendra's of the districts viz., Dhubri , Barpeta Nalbari, Kamrup, Nagaon , Marigaon, Lakhimpur Sonitpur, Darrang , Golaghat, Jorhat Sivsagar, Karbi Anglong and Krishi Vigyan Kendra (KVK), Cachar under AAU will be involved in this project. It is also proposed to have one Project Assistant with at least MSc (Agri) degree in each of the station with a total of 21 (twenty one).

As an implementing partner AAU's role will be of multi-fold. AAU will develop training calendar as well as training module to build the capacity of ATMA staffs, departmental staffs as well as farmers through training. AAU will be the leading organization in conducting "on farm testing" / adaptive trials and "Front Line Demonstrations (FLD)" on various crops such as rice, pulses, vegetables, banana, etc. as per the technology/guidance provided by the national & international organizations like International Rice Research Institute (IRRI), World Vegetable Centre (WVC), National Research Centre for Banana (NRC for Banana, Tirchy, ICAR) etc. The most important work that is to be done by AAU is to develop the farmers' friendly Packages of Practices for crops and fisheries as per the present day context.

(c) **Roles and responsibilities of Department of Agriculture and Horticulture**: Since, department of Agriculture & Horticulture will be the operational project implementation unit (PIU) for this subcomponent, hence they will be the main nodal agency for overall implementation of all activities. They will coordinate with all the above organizations in planning, implementing, monitoring, supervising etc. to perform all the activities at right time and right way. Both these departments will keep close coordination with ARIAS Society which is the Project Coordination Unit (PCU) of the project. To have a better coordination and linkages among the departmental staff, ATMA and AAU, State level and zonal level workshops will be organized. It will help in better coordination, improvement in the project activities and also suggest future scope for improvement. The farmers of FPO will be provided need based training on various aspects which may include technical training, training on book keeping/accounting, marketing management etc. by various experts as per the training module and calendar developed by AAU. The market led climate resilient demonstration on various commodities will be organized at the farmers' field of FPO. Since the training and demonstrations could not be organized in all farmers field, hence some basic criteria to be followed for selecting the farmers for training and demonstrations. The demonstration on post harvest management and value addition will also be organized at FPO/CSC level.

(d) **Roles and responsibilities of service provider:** Service Provider (SP) will have some definite roles and responsibilities in this aspect. These are:

i) Based on the baseline survey, Service Provider will develop the training need assessment of the growers and with the help of Assam Agricultural University

(AAU), ATMAs and department of Agriculture & Horticulture will develop a training module and with proper consultation with this agency/department will prepare a detailed plan for delivering the training to the growers.

ii) Based on the baseline survey, Service Provider in consultation with the ARIASS will develop a plan for mobilizing the interested farmers in the project area into common interest group (CIG)/ farmer interest group (FIG). Once the plan is agreed, service provider using PRI and other techniques would start mobilizing the groups to form CIG/FIG.

iii) After the groups (common interest groups – (CIGs)/farmer interest groups (FIGs) are mobilized, service provider would initiate federating these CIGs/FIGs into a well-structured farmer producer organization (FPO) with the aim to register under producer company act. Service provider will facilitate and guide the FPCs in preparing the by-laws, setting up of a sound governance structure of the FPC, registering with the registrar of companies, and associated tasks related to the registration process.

iv) Service provider would be supporting the producer organization till the time the FPOs attain the maturity in terms of managing the business independently either themselves or through hiring required experts / professionals. The service provider arrangement by the project to FPO would be available for about 36 months (time period would include farmer mobilization, capacity building, business plan development, producer company registration, and handholding of FPO) and the FPO on gaining financial autonomy and robust business acumen could deploy its own personnel.

v) Service provider may also facilitate obtaining financial support from other government schemes, bilateral/multilateral donor agencies etc., as per its business plans and with prior knowledge and approval from the ARIASS. They would also facilitate the process of seeking the external loan, grants and project based funding for implementing the approved business plan of the FPO.

174. Critical Issues to be addressed

(a) **Filling up vacant positions and starting field activities**: At present most of the ATMA positions are vacant and practically no field activities are being undertaken. There is an urgent need to provide adequate funds in FY 2016-17 to ATMAs of the project districts, fill up vacant positions and implement demonstrations, capacity building and other activities.

(b) **Linkages of ARIAS Society with ATMAs**: The ARIAS Society is the central coordinating agency for the project, and implementation of project activities is the responsibility of state line departments and district ATMAs. For ownership and smooth implementation of APART, it is necessary to have strong linkages of ARIAS Society with Departments of Agriculture and Horticulture, and ATMAs similar to the institutionalized link which existed in AACP.

175. Result Chain and Result Framework:

(a) Result Chain:

Activities	Sub Activities	Output	Outcome
Strengthening of ATMAs	Manpower Support to ATMA	Increased capacity of ATMA officials leading to better service delivery	Increased productivity
	Strengthening / upgradation of infrastructure	Create a better working environment	Increase in value of marketed output at the farmer level
Value Chain Action Plans	Identification of production clusters for each commodity / Conduct awareness meetings and Road shows	Finalization of locations for project interventions for production enhancement	Increased quality as measured by price premium of produce sold by beneficiary farmers in the value chains
Capacity building and Outreach	Sensitization of farmers on the advantages of collectives	Better coherence and affinity amongst the farmers of the clusters towards collectives	
	Demonstration and training in market led climate smart production	Identification of gaps in the farming practices with respect to climate resilient and market led production	
		Increased number of farmers aware of climate resilient technologies and adopting demonstrated technologies	
		Increased number of farmers adopting IPM and/or INM practices	
		Increased Land area where sustainable land management practices have been adopted	

(b) Result Framework

Sl	Indicator Name	Units	Base-line	Cumulative Target Values						
				Y-1	Y-2	Y-3	Y-4	Y-5	Y-6	End Target YR7
1	No of demonstrations on climate resilient technologies to be conducted by Agriculture and Horticulture Deptts.	Nos. of Demos		1814	5054	9164	13274	17034	20234	22000
2	No of demonstrations on climate resilient technologies conducted by Assam Agricultural University	No. of Demos	0	210	450	690	832	832	832	832
3	**Number of trainings conducted**									
	Training of BTM and ATM	persons		60	150	270	328			328
	Training of Departmental Staff	persons		90	180	300	384			384
	Orientation programme for AAU staff	persons		60	120					120
	Training of nursery growers	training		20	40	60	100	140	140	140
4	No. of farmers adopting demonstrated climate resilient technologies	Nos.	0	0	30000	80000	108000	240000	360000	360000

Sub-Component C1.2: Pork Value Chain

176. Pork value chain- an overview: Investments under this sub-component will cover production, aggregation, processing and marketing. Key interventions planned for enhancing pork value chain include vaccination against endemic diseases; production of breeding boars and quality cross-bred boars via artificial incrimination (AI). Local resource persons/lead farmers would be trained as community resources 'pig bandhus' to support services delivery on fee for service basis. Existing market areas (about 27 or 1 for every 2 clusters) would be upgraded to facilitate aggregation for large volume traders, and market linkages would be facilitated between the large volume processors and small scale slaughter facilities constructed to support each cluster. Also, butchers and local vendors will be trained in humane, hygienic, slaughtering methods. Vendors and butchers would be monitored and certified under the FSSAI. The project would support a market assessment including of health risks and consumer awareness campaign focusing on food safety and human health risks from zoonotic diseases. Hygienic vendor booths would also be demonstrated in prominent local markets. The draft value chain development plan for piggery value chain is annexed *at C 1.2 (a).*

177. Component Objectives: Pig production in Assam is a small scale, backyard and consumer based business. The pig rearers are facing lots of problems in production, value addition and marketing etc. with the individual effort small farmers cannot handle all these things which results in lower level of income. So to make them well organized and to increase the production and marketing through collective approach and thereby helping the farmers to obtain better price for their produce, this project would intervene in this sector has the objective to increase supply of quality pork, create jobs and increase the productivity and profitability of small holder pig producers; specific objectives include.

(a) Increased production through genetic improvement of indigenous pigs through selective and crossbreeding

(b) Address the issues related to feed shortage and improvement of nutrient utilization for enhancing pig production

(c) Development of pig health management systems

(d) Post harvest management and value addition of pork

(e) Promote environment friendly and climate resilient pig farming

(f) Promoting entrepreneurial development in forward and backward front of pig production.

(g) Address the much needed issue of Food safety as per FSSAI norms from production, processing and value addition, cold chain maintenance upto retailing.

(h) Formation of Farmer Producer Organization (FPO) in production clusters to undertake the various activities in group basis and organized way which is difficult to perform by an individual farmer

178. Policy and Regulatory Environment: The FPOs to be formed under this project will be registered under the Societies Registration Act of 1860 or may be under Company's Act and hence they will function as per the policy and regulatory framework of Societies Registration Act/Company's Act and as per the byelaws of the organization which will be framed by the FPOs with the help of Service Provider. The management of the organization will be done by the elected board which will be constituted by the member farmers. As the FPOs will be the organization of member farmers, therefore the representatives of farmers will actually manage and oversee the affairs of FPO. The following policy level issues will be addressed for successful implementation of the project:

Sl.	Objects	Implementing Deptt./ Agency
1	MoU for ensuring Quality and Food safety under FSSAI	Local Authority, FSSAI
2	PPP agreement for Rendering plant	ALPCO/ AHVD
3	Formulation of Pig Breeding Policy	AHVD/NRCP/ILRI
4	PPP arrangement for management of pig breeding units owned by AHVD at Kothiatoli, Morigaon.(Each one has 100 sow & 20 boar unit)	AHVD
5	Live animal import policy and performance requirements	NRCP/ ILRI
6	Export certification	NTCP/APEDA
7	Contract to supply Vaccine for key diseases (CSF) from Indian immunologicals, IVB Bangaluru.	AHVD
8	Designs programme for farm level production unit customized for cluster	AHVD/ ALPCO/ILRI
9	Designs programme for processing customized for cluster	AHVD/ ALPCO/ILRI
10	PPP for liquid semen processing , production and distribution	NRCP/AHVD
11	Policy reform to have Animal health Service provider selected from the cluster itself to cater the need (vaccination, de-worming, ration balancing etc) within the cluster. These service providers from all clusters will be connected to a central point (FPC/FPO/Vets.) for any information/service	AHVD
12	Identification of the key private partners in the value chain for breeding, multiplier, rendering , processing ,feed and service delivery etc	AHVD/ALPCO
13	Policy reforms for facilitating Uninterrupted production as well as procurement of bulk vaccines (CSF,PRRS) in Institute of Veterinary Biological.	AHVD

179. Eligibility and Selection Criteria For Cluster, Beneficiary & FPO Member:

(a) **Selection of Clusters**:

- Minimum of 100 families within 3km radius comprising of 2-3 pigs per family
- Access to input delivery services (feed, vaccine, medicine etc.)
- Road connectivity to the clusters
- Access to Market
- Access to financial services
- Access to technical services

(b) **Selection of Beneficiary (For Demonstration**):

- Farmer with min 5 crossbred pigs
- Experienced in pig farming for at least 5 years
- Progressive farmer
- Connected with road
- Availability of required facilities (electricity, water etc.)
- Access to the market

(c) **Selection Criteria for Membership of FPO**

- Farmer member within the designated cluster area.
- Willingness & capability to pay share capital.
- Willingness of farmers to become members of FPO.
- A farmer who will actively participate in all functions and activities of FPO.

180. Activities to be financed

(a) **Productivity Enhancement**:

(i) **Institution Building (Aggregation of Farmers):** Up-scaling of trade volume: Identification Developmental Blocks as Cluster having maximum pig production. The pig production in the state is mostly backyard/ family oriented operation, though the state is sharing the highest pig population in the country (16.13%). To compete with the emerging market situation, production volume, quality assurance, market competitiveness the cluster approach in production is the probable solution. The following interventions are proposed for formation of cluster:

- Identification of potential areas with considerable pig rearing population as production cluster
- Reorientation of existing clusters, Prioritize FIG formation (contact the promoting organization / engagement of service provider) in active participation of the Animal Husbandry & Veterinary Department.
- Sensitization of the clusters of a specified area for formation of FPO /FPC for commercial sustainability in long run operation.

(ii) The cluster approach will increase the accessibility to scientific breeding and feeding practices enabling attainment of optimum marketable growth of their pigs in minimum time. The cluster approach will also facilitate better bargaining power in both output and input segment which gives in remunerative price of produces and reduction in input cost. This will also help in better access to the extension services, market information, technical backup. In cluster, involvement of women becomes most prominent due to vibrancy in social cohesiveness and the confidence building among them.

(iii) The FIG will consist of 10 pig rearing family member and it is assumed that about 1000 farm family will be included per cluster. All together 56 clusters are identified for intervention with a range of farming families from nos to on an average approx. 1000 pig rearing families per cluster.

(b) **Market led production & climate resilient services delivery (Producing, size, healthy breeds etc)**: Pig rearing in the state is mostly a family oriented traditional operation to cater the need of the local market only. There is hardly any commercial approach exists in the state. In the face of changing time the newer generation farmers, both traditional and non traditional ones are gradually adopting commercial production with scientific management and better scale of operation. The traditional farmers have little knowledge on food safety, public health risk and zoonotic issues in pig rearing. To bring about the change, a market led approach in production is proposed with interventions on demonstration of climate resilient pig housing and management for climate smart production.

- Demonstration of climate resilient, pig sty for breeders and fatteners with manure management facility for minimizing GHG emission- Slated floor.
- Demonstration of low cost climate resilient Bokashi piggery which are more adapted to heat and less susceptible to disease during monsoons
- Training of farmers on breeding, feeding & nutrition, animal health, housing management and marketing
- Organization of Field day

- Awareness generation on CSF, FMD, PRRS, Cysticercosis, deworming, min mix supplementation and zoonotic issues.

Adoption of demonstrated technology by the farmers will enable shifting from the small scale traditional way of production to commercially viable market driven approach with compliance of food safety norms. Community participation in the demonstration as a beneficiary contribution @20% in kinds of the total unit cost besides the land requirement for the purpose. 80% matching grant will be released as advance after satisfactory utilization of the beneficiary contribution and rest 20% will be released only after completion of the work as reimbursement. The selection process of farmers for demonstration will be carried out by the community in association with the local AHVD officials and Pig Bandhus as per the pre-defined selection criteria mentioned in the project plan. The demonstrations will be conducted by the Local AHVD officials along with pig bondhus as per technical guidance from NRC-Pig.

The performance of the demos will be critically observed and analysed and based on these the most suitable model will be identified, standardized and promoted in consultation with NRCP, ILRI and farmers for large scale adoption.

To ensure better utilization of farm manure, increased crop productivity and reduced effect on environment, it is proposed to collect and utilize farm manures for kitchen gardening, cultivation of food feed crops legume crops and other farming practices. Effort will be made to reduce the runoff the manure to streams, ponds and rivers etc to prevent water contamination.

Training Strategy: Included under section C.1.6 to be included, Curriculum, TOT etc. ILRI will design and develop training curriculum and manuals, impart training to the AHVD officials and other local resource persons of project districts as trainer (TOT). This trained resource persons will impart training in the field to the selected beneficiaries based on their need and interest.

Activity	**Target**	**Responsibility**	
Training Design & Curriculum	Producer, Pig Bondhu, Pork Vendors	ILRI	AHVD +
Training Manual	Producer, Pig Bondhu, Pork Vendors	ILRI	AHVD+AAU+NRCP+HI
Master Trainer	AAU+AHVD	ILRI	AAU+NRCP
TOT	AHVD district officials+ KVK+ trainer	ILRI	Master Trainer
Field Training	Farmers, Pig Bondhu, Pork Vendors	AHVD	Trainer
Training Monitoring tools	Master trainer, TOT	ILRI	AHVD
Adoption of improve practice matrix	All training	AHVD	ILRI
Training reporting	All training	AHVD	ILRI

(c) **Feeding Management:** Judicious use of Feed stuff for production enhancement: Analysis of nutritive value of the local unconventional feed resource & ration balancing and targeted supplementation. Bulk purchasing of concentrate feed will be the responsibility of the FPO and purchased feed will be stored at CSC for procurement by the farmers. One of the major issues found during the Value chain analysis was that, the prevailing feeding practices are not based on the scientific principles. Majority of the farmers feed their animals on the basis of locally available feed resources, irrespective of their nutritional value required for optimum growth and quality production. This imbalanced feeding practice leads to reduction in quality production and productivity. To address the issue, the existing nutritional gap will be assessed and effort will be made to support local feed manufactures to produce customized supplementary feed based on the gap assessment. In addition, food feed crop cultivation at the back yard and ration balancing will be promoted. The objective of the feeding initiative is to increase productivity, FCR, ADG and reduce wastage and spoilage caused by imbalanced feeding. The following activities are proposed to achieve the stated objective–

- Analysis of nutritive value of the local unconventional feed resource & ration balancing based on analysed data & existing feed database. This would build on existing feed data bases awareness generation and skills development by training
- Demonstration of ration balancing in each cluster by AHVD official with support from NRCP
- Demonstration of improvising of food feed crops by minimal processing
- Training of Farmers as part of Farmer Field School (FFS)
- Organization of field day

The estimation of the nutritive value of the locally available feed resources will be carried out by NRCP and build on existing feed libraries and recommendation for computation of balance ration with the existing indigenous resources. They also recommend the nutrient gap for additional supplementation as and when required. The local AHVD officials and the pig bondhu will implement the programme as per the guidelines provided by the NRCP. The nutrient content of the non conventional feed stuff and ration balancing formulas will be fitted into a software to be developed under this project and the same will be used through tablets to be provided to pig bondhus. They would provide services to the farmers at the door step using the outsourced soft ware.

(d) **Linkages for bulk procurement of animal feed raw materials**: Production of concentrated feed for pig is very limited in the state. The sustainability of feed production lies on the bulk procurement of inputs. In Assam maize production is growing year by year and maize is the major ingredient of animal feed. The maize production clusters will be linked with the feed processing houses through Agriculture Deptt/ ASAMB and the bulk storage capacity of the Assam State Warehousing Corporation (ASWC) could be utilized for bulk storage near by the production centres. Discussions have already been held with concerned departments and stakeholders.

The linkages and procurement strategy of the maize and other ingredients required for the production clusters will be carried out in association with the AHVD, Agriculture Deptt and ASMB/ASWHC by the CSC/ FPO to be formed under the project.

(e) **Improvement of Breeding Practices among farmers for better productivity**:

(i) **Establishment of Local Service Provider**: **Pig bondhu**: The brigade of Pig Bondhu will be created by selecting community representative and imparting them training on improvement of breeding, feeding, healthcare, management and advisory services. Pig bondhus will particularly focus on delivery of AI services. Poor productivity of existing germplasm and lack of heterogeneity in the existing gene pool leads to inbreeding depression, which requires prompt interventions to prevent further loss of the farmers. Breeding activities at cluster level by community boar management and introduction of AI with heterogeneous germplasm will go a long way in mitigation of this burning problem. Hence, the activities proposed under this project are–

- Awareness on animal identification and regular boar exchange
- Awareness on breed up gradation, boar selection and as appropriate alternative approaches such as use of AI by high genetic quality boars
- Establishment of the Local AI worker (Equipments for AI, first aid kit, extension materials etc.)
- Introduction of community boar at cluster level with 6 month feeding & community exchange of boar every year.
- Record keeping for avoiding inbreeding at cluster level(CSC)

- The Pig Bandhu will be supported with a tablet equipped with traceability and ration balancing software

The Pig bondhu will provide door step service delivery to the farmers on payment basis to make it sustainable in approach, however their fees will be affordable to the poor pig producers. A person having tenth standard education and experience in pig rearing/ first aid, willing to engage him/her as local service provider will preferably be selected. It is estimated that a pig bondhu will look after 50 FIGs in each cluster within a specified geographical area under the supervision of Local Block Veterinary dispensary.

AHVD & out sourced service provider (NGO) supporting FPO will carry out the sensitization programme on breed upgradation & AI services for productivity & production enhancement in the cluster. All the records on breeding, production, healthcare and marketing will be recorded by the pig bondhu and the records will be incorporated in the MIS.

The pig bondhus will operate with 224 breedable sows for AI service and at least 500 fatteners produced in a year to make it remunerative & sustainable. It is estimated that the pig bondhu will earn an amount of Rs.8000/- per month from the AI service as well as other basic veterinary & extension services at farmers door step.

(ii) **Evidence generation for supporting pig breeding policy for the state of Assam**: The use of superior pig genetics - coupled with appropriate pig management practices in relation to pig health-care and feeding – can result in marked increases in both pig productivity and household income from pig keeping. One key enabler to this is a supportive policy on pig breeding and (if relevant) conservation. We will support the development of a pig breeding policy through: synthesizing relevant evidence on the impact of different options for improving pig genetics; assessing current pig breeds, cross-breeds and systems and recommending improvements; assessing need for germplasm and recommending options for obtaining; providing guidelines for development of a breeding policy and assist in formulating a policy; build capacity and develop materials to assist strategy implementation and monitoring. For this, we will follow the approach of ILRI that they have followed formulate pig breeding policy for the state of Nagaland.

Towards framing the Pig Breeding Policy, AHVD has initiated the process to form an expert committee with the members from AHVD, NRCP, AAU, NBGAR and ILRI. The committee will be responsible for drafting the policy. The policy should reflect the need and interest of wide range of stakeholders that will be assessed through several consultations at block level, district level and state level. The finding of the consultation will be documented and produce as a background policy document. The policy would also consider the existing infrastructure and manpower resources and need of the infrastructure, manpower, capacity and financial resources to implement the policy.

The policy would also taken into consideration of emerging challenges of climate change, international trade, trans boundary diseases etc. The policy will be first drafted by the expert committee which will be reviewed time and again in consultation with the top bureaucrats, entrepreneurs, service providers, traders, processors, smallholder producers, feed manufacturers etc. This will be supported by primary evidence on stakeholders preferred breeds in different agro-climatic zones, demand-supply situation of piglets , information; knowledge on existing breeding policies in the country; breeding performance, productivity, and demand in the market. ILRI will generate those evidences and support the expert committee by supplying the above information. Finally, the Ministry of Agriculture, Govt. of India and National Bureau of Animal Genetics Resources (NBGAR) will be requested to review the policy so that the proposed policy does not conflict with any existing policies of GoI or NBGAR

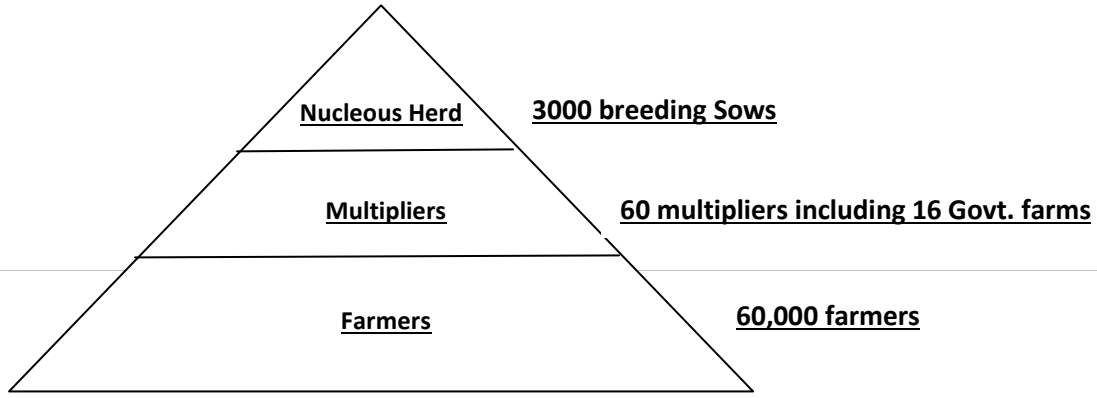
(iii) **Production of Breeding Stock**: Operationalization of the newly constructed Pig breeding Farms of the AHVD as Nucleus farm for seed development with exotic germplasm. To produce high quality germplasm with improved gene pool and heterogeneity, a quality nucleolus breeding stock will be maintained in a scientifically managed breeding farm to supply breeding animals. The breeding animals will be supplied to the Multiplier farms for production of piglets to the farmers. The newly constructed Pig breeding farms of AHVD at Kothiatoli & Morigaon may be strengthened with induction of pureline exotic breeding herd.

Germplasm preferably of Large Black, Hampshire and Large White Yorkshire will be inducted in three farms including Morigaon and Kothiatoli pig farm as nucleus herd to produce breeding stock for multipliers. The best germplasm available in the country will be sourced initially for the nucleolus herd. Subsequently effort will also be made to import from abroad.

Operationalization of existing pig breeding farms under AHVD as multiplier farm under PPP mode and with precondition the multipliers will supply the piglets to the project beneficiary on priority basis . Multipliers will get the pureline germplasm from the nucleolus herd and they will produce crossbred boars for the farmers.

Establishment of linkage among the nucleus herd, multipliers and farmers for dissemination of improved stock in the supply chain. They would further be supported by creating linkages with financial institution, insurance companies, vety. Service providers, registration agency, training, etc.).

The private entrepreneurs in each cluster will be supported to start multipliers or to run existing government breeding farms under public-private partnership. They would be responsible for supplying the breeding stock to the smallholders.



Pig Breeding Strategy

(f) **Mentoring managers of government pig breeding farms:** A training needs assessment for government pig breeding farm managers and based on this develop a tailored, blended-lending course (that is, a course combining face-to-face and e-learning) and development of a mentoring program to support farm managers and meet their needs for technical backstopping. This will include guidance on breeding strategy implementation and reporting. It is also proposed to organize an exposure visit for the concerned government officials to Vietnam where pig system is growing rapidly. ILRI will facilitate a study tour for pig production stakeholders (livestock production and animal health officers and farmer representative) in Vietnam to expose them to the Vietnamese pig industry. ILRI will also bring Vietnamese pig breeding experts to Guwahati to advise on breeding policy. This will build on the very successful 2009 South-South dairy symposium which brought key dairy stakeholders from Assam to

Kenya and the study visit of pig sector stakeholders from Nagaland to Vietnam in 2016. ILRI role: Capacity-building and mentoring; organising study tour Deliverables: Training course.

(g) **Induction of Community Boars**: Crossbred community boars preferably of Large Black, Hampshire and Large White Yorkshire as per the recommendation of Package of Practices on Livestock will be inducted in the project areas with 1 boar: 10 female ratio for upgradation of the local breeds for improved productivity. This will also bring about heterogeneity in the local gene pool. The community boars of different locality will be interchanged in a regular intervals to prevent inbreeding depression. Some of the breeding boars will be supplied from the multiplier farms strengthened under the project and some of the boars will be sourced initially from outside the state. The progressive farmers with sufficient facilities to maintain a boar willing to rear a boar and contribute @ 20% as / their share against the cost of the pureline boar can be selected for the community boar programme. The farmer will charge fee against the natural services @Rs.300/- per service or as deem fit.

(h) **Establishment of AI Services at farmers door step**: NRC Pig has already initiated AI of Pig with liquid semen in a cost effective manner with a simple technology which can be adopted even by a farmer after training. As the state has acute shortage of quality breeding boars, the AI can be a very timely and viable option for increasing market led productivity of the farmers. Initially, AI workers will be selected @ one /cluster and trained in NRC for AI service delivery and provided with the inputs for conducting AI in his respective area. The semen will be sourced from NRC initially. Some satellite semen collection centers will be established in the project districts to minimize the cost of transportation and facilitating easy availability. The cold chain facility required for the storage of the semen will be provided in the CSCs. The AI service provider or PIG BONDHU will cater the need of their area from those CSCs which in turn get the semen from the satellite semen collection centers. The pig bondhus will be a viable proposition provided the area of his service is having minimum 224 breedable sows for AI service and atleast 500 fatteners produced in a year. The pig bondhu can earn and amount of Rs.8000/- per months from the AI service as well as other basic Animal Husbandry services at farmers door step.

(i) **Implementation of performance recording system at Nucleus herd, Multiplier & farmers level**: For effective conduction of any breeding programme a performance recording system is a must. The proper record maintenance is mandatory both in Nucleolus herd (having the exotic parent stock) and Multiplier private farms. This will help in addressing the major prevailing issue of inbreeding depression in the field. It will also help in maintaining traceability in the entire production line. An MIS for the purpose is proposed which can record the data from field AI (with ear tag or farmer code), production at multiplier farm and Nucleolus farm level. The data of each cluster will be fed in the system installed in CSCs to be maintained in a common server. The sale of piglets through the CSC will also be recorded in the MIS which will link up the production data with marketing to provide perfect traceability.

(j) **Establishment of Satellite centre for liquid boar semen processing:** The existing breeding farms of the AHVD could be incorporated with semen collection and processing facilities for production of liquid boar semen so that the availability of the semen can be maintained locally. The CSC will be provided with the facility for preservation of liquid semen and the Pig Bondhu as well as the AHVD personnel will deliver services for insemination as per the requirement. A large number of existing liquid semen laboratories of the AHVD are lying unused since long in different districts after introduction of frozen semen in the state. Out of these, 6 nos of laboratories are proposed for upgradation for liquid boar semen processing in different zones for local requirement. The existing staffs of the Labs will be trained at NRC pig for the purpose and breeding farms of the Deptt. will be strengthened for rearing of boar and semen collection. Laboratories at Demow Intensive Cattle Development Program (ICDP), Baghchung Jorhat, Biswanath chariali, Kokrajhar, Khanapara, Manja ICDP laboratory are proposed for development of liquid boar semen processing & distribution centre under the project. Breeding farms of

the Deptt. as well as some pvt. Breeders will maintain required breeding boars nearby locations of the laboratories for semen production.

(k) **Market led Extension Support (Services Hub)**: Establishment of Common Service Centre (CSC) will provide extension support to the cluster through locally available input services. It will provide a common platform for the farmers of the clusters to avail breeding facilities, assess to concentrate feed at cheaper price and feed grinding facility of locally available ingredients, cold storage facility for vaccines as well as pig semen, cold storage for meat and meat products, weighing facility, a small multipurpose meeting chamber and facility for market information services. It will facilitate the transfer of technology for customized production of pig to fulfil the nature of market demand. The CSCs may also provide linkage for financial support and insurance facilities to the farmers within the clusters. The CSCs will also have facility for data entry device with operator for maintaining the cluster level information. CSCs will also provide a common site for farmer gatherings for any social issues. CSC will be managed and operated by FPO. Initial activities for the clusters will be operated directly from the existing network of the AHVD till the FPOs are fully functional. Following components for CSC are proposed under the project to achieve this objective.

- Creation of facility for AI with provision for semen storage.
- Identifying the local service provider.
- Establishment of godown for feed & medicine
- Feed grinding facility.
- Cold chain for preservation of vaccine, meat & meat products etc.
- Creation of weighing facility for live animal
- Computerization for data entry of registration, trading, production and slaughtering.
- Low cost small scale slaughter house (10 animals per day max).
- mini multipurpose meeting hall
- Exposure visit of the farmers to demos improved pig production belts, commercial farms, processing houses, markets etc.

(l) **Improved Animal Health care Services**: **Contract for bulk procurement of vaccine**: Occurrence of Classical Swine Fever (CSF) is a common problem faced by the farmer of the state. The production and availability of the CSF vaccine of State Veterinary Biologicals is not adequate to cater the need of the largest pig population of the state. Moreover the vaccine is not readily available in the open market which again added up to the problem. As the Institute of Veterinary Biologicals of the AHVD producing lapinized CSF vaccine, bulk production is not possible and existing production can only cover 1% of the total requirement. Keeping in view of the above either, project will support procurement of CSF vaccine subject to approval by the World Bank. The vaccination along with the necessary deworming etc will be conducted through the Pig Bondhus under supervision of existing service delivery network of AHVD as per the annual immunization calendar.

(m) **Capacity Building of value chain actors**: Right kind of knowledge and capacity can enhance productivity, reduce incidence of disease and improve hygiene and pork food safety. Therefore it is proposed to impart need based training to producers, traders, pork vendors/retailers and transporters on improved pig production and management, improved breeding and nutrition, diseases management and control, transportation and animal welfare, pig pricing system, hygiene and pork safety, slaughtering, handling and displaying of pork and on prevailing regulation that regulate the market. While NRCP will impart hands on training to butchers and A.I workers (Pig Bandhu). All the training will be need based, user friendly and will be organized at the convenient place and time of the target groups in the

field in order to increase participation of the target groups (both male and female). Before rolling down the training in the field, a comprehensive training plan will be designed and training of trainers (ToT) programme will be organized. Resource persons for training will be gathered from the Vety Deptt., AAU and experienced farmers/ butchers/traders and local opinion leaders (to motivate the target groups). To implement the pork value chain project successfully, it is also felt necessary to impart training and exposure visits for the govt. officials (including policy makers) to motivate them and to keep them abreast with the improved scientific knowledge and practices.

Therefore, it is proposed to organize some need based training and exposure visit for govt. officials under the project .Immediately after each training, a Pig/Pork Monitoring Committee (PMC) will be constituted among the trained actors to monitor the adoption of improved practices taught in the training by the fellow farmers/ traders/butchers using a simple monitoring tool to be developed by ILRI. The committee will monitor the fellow members at least once in a month and submit the monitoring tool to the project officials for second level of monitoring and verification using the same tool. Project officials would consider it as another opportunity to motivate the trainees and help them in adopting improved practices in their own field. The monitoring process would be repeated several times in a span of six months to ensure adoption of improved practices. All successful adopters will be awarded with a training certificate in a ceremonial distribution event to be attended by senior government officials as a mark of appreciation and honour to the successful trainees. The list of trained market actors would be forwarded to Municipal Corporation/ FSSAI for issuing (or renewing) trade license/registration. Based on the need, refresher training will also be organized to ensure adoption of improved practices. Role of ILRI: Organize training of trainers (ToT), facilitate training, design and develop training implementation plan and develop monitoring tool and assist in monitoring.

(n) **Manuals on pig management, pork quality and safety for value chain actors:** Current training for pig value chain actors is based on experience of trainers and is not reproducible and sometimes, wrong information is taught. Basing training on the risk assessment, rapid participatory assessment of knowledge attitude and practices, and best practices will help develop a manual that is relevant, accurate and evidence based. It will cover improved pig production and management, improved breeding and nutrition, diseases management and control, transportation and animal welfare, pig pricing system, hygiene and pork safety, slaughtering, handling and displaying of pork, prevailing regulation that regulate the market and so on. A writers' workshop (ILRI scientists, technical experts including Heifer, Wageningen, AAU, targeted value chain actors and experts on adult learning techniques and communication product development) will be organized and the draft will be thoroughly reviewed by technical experts to ensure information is need based and practices are affordable, accessible and acceptable to target groups. Training manuals will be field-tested before finalization and final manuals will be translated to local language for the use by the target groups. ILRI role: Designing, drafting, finalization and translation of training manuals Deliverable: Training manuals for printing by the AHVD

(o) **Aggregation & Marketing**: Market Development: Identification of Livestock market to be designated / re-designated for development of infrastructure in collaboration with Assam State Agricultural Marketing Board. The livestock & meat markets in the state are not developed as per the defined norms. Though some amount of aggregation is done in the existing markets , it is done by the individual farmers only, not from a systematic clustered approach with significant volume of the trade. Moreover, the meat markets are mostly open air operation and the traders and consumers are not at all bothered about meat hygiene and food safety risk. This is due to lack of awareness crippled with insufficient infrastructure. To address these problems the following interventions are proposed under the project especially the markets deals with pork marketing:

- Identification of market to be designated / re-designated where pig/ pork traded in a big way and can be linked to major production clusters with significant marketable volume.
- **Infrastructure development of the pig/ piglet and meat market**- especially pork market (Holding Shed, Drainage and waste management infrastructure, running water supply provision, Public toilet facility, internal & outside road linkage, ramp for loading & unloading of animals, and pork vending platform type market shed with fly-proof netting.)
- Optional facilities for small scale slaughter hall in the markets closely situated with the production cluster.
- Electronic weighing machine/platform, Computerization with digital display ,

The above interventions will create a conducive marketing environment in which food safety issues can be addressed properly and the public health hazard will be reduced considerably. It will also expected to establish better price discovery mechanism for the producer along with remunerative price for the traders and quality assurance on pork for the consumer.

(p) **Transparency and traceability**: To bring about transparency along the entire chain of pork production right from production, processing and retailing, maintaining traceability is utmost important. This is also very important from food safety point of view as well as for keeping breeding records and managing disease prevention and control programs. Following activities are identified to maintain traceability.

- Procurement, Development and installation of MIS for online data management for registration, production, marketing and slaughtering.
- Procurement of data entry device - computer etc at data entry point (CSC of Cluster/FPO)
- Arrangement for cluster wise tagging and registration(procurement of UID, farmer's registration form/booklet),
- Training on identification, data entry

(q) Animal Husbandry & Veterinary Department is going to implement the programme for maintaining the traceability of all categories of pig population viz, Fatteners, breeders, piglets so that the containment of the inbreeding depression through indiscriminate breeding practicing by the common farmers in the state. Pig bandhus will be primarily responsible with oversight from paravet and operating under the block level vet. The record of immunization, deworming, Breeding activities, marketing, processing, food safety issues etc. will be monitored through this intervention. The pig bondhus in supervision of the local AHVD officials the project clusters will execute the programme. All the records will be entered into the MIS will be developed under the project. Tablets/ Notepads will be provided with MIS enable software for record keeping and ration balancing to be monitored at AHVD HQ level.

(r) **Linkage with High Volume processing houses with Input & Output Chain**: Facilitating linkages and contract with high volume processing houses to the input chain (production clusters through CSCs) and vendors for sale of hygienic pork & pork products in the market. This will provide sufficient scope for development of a consistently significant volume of input supply to processing houses as well as development of fair market for growth of hygienic meat as well as public awareness on safe pork. This will be achieved through concerted efforts involving all stakeholders.

(s) **Animal Welfare & Hassle free transportation**: Facilitation for obtaining Livestock transit permit for traders. It is observed that the marketing cost of pig as well as pork is always found inflated due to involvement of hidden cost during transportation. This leads to the increase the consumer cost as

well as results decrease in the profit margin for the traders/ producer. To address this issue Facilitation for licensing and liaising with Transport authority is proposed under the project so that hassle free transportation of the pig and pork can be achieved with proper transit permit. Proper liaising with transport department/authority in this regard will be ensured. This will directly impact in the profit margin of the traders as well as the producer and also consumer can get in a cheaper price. Providing on subsidy, insulated van to prominent production clusters on need basis can also be considered under this project to facilitate scientific transportation of the meat & meat products from low cost slaughter house to the retailers. Capacity Conversion of vendors from road side vending to licensed hygienic pork vendors. Training of the vendors by ToT developed by NRC so that increase demand for clean pork from the structured meat shop can be obtained and also to elevate the social status of the pork vendors. Monitoring of the trained vendors by peer group to review the adoption of standard operational practices as per FSSAI norms so that the facilitation for licensing could be done..

(t) **Processing, value addition & marketing**: The provision of a scientific slaughter house and the facility of humane stunning method, step by step slaughtering, primary and secondary processing (value addition), packaging and proper transportation of the products in insulated transportation to the retailers are some of the pressing needs indicated by the value chain analysis. Moreover the importance of a scientific backward linkage from production to the slaughter house including that in PPP mode is also equally important for production of marketable quality meat and meat products to comply the FSSAI norms. So activities on these lines are listed below are proposed under this project which will not only satisfy the market requirement but also satisfy all norms of the public health.

- Identification and assessment (to include also PPP) of low cost processing houses / central large scale slaughter houses with primary and secondary processing facility.
- Organization and establishment of the backward linkage from producer to processing house through a cluster approach
- Strengthening of the transport facility to carry live pigs from clusters to processing houses – supply of transport vans to CSCs as per needs of the cluster populations. Might be easier to contract out the transport.
- PPP for Strengthening of selected centrally located processing house to meet the FSSAI norms - Facilitation for aggregation, linkages with the production cluster for ready raw materials in an un interrupted supply chain.
- Organization of the forward linkage from processing house to retailers - Establishment of Linkage from the processing house to the retail outlets and super markets etc.
- Maintenance of cold chain - Procurement of insulated van for transportation of meat and meat products from processing house to the retailers and arrangement of deep freezers to selected retailers dealing large volume of meat & meat products in regular basis.
- Facilitation for Export - Facilitation of the Processing houses for obtaining Export License.

(u) Assam Livestock and Poultry Corporation (ALPCo) will take lead for the post harvest value chain of the pig subsector through organization of production clusters for aggregation in bulk for organized buyers through CSC/ FPO established linkages with the large processing houses as well as the low cost slaughterhouses. Establishment of low cost slaughterhouses at selected markets and at CSC linked to local cluster linked market will be carried out by the Corporation in technical collaboration with the NRC-Pig. It is proposed that 38 Low cost slaughterhouses at CSC level and 15 cluster linked selected market will be established in phased manner so that the primary processing of pork can be done in a hygienic manner by compliance of FSSAI norms.

(v) **Establishment of meat vending cubicles:** To facilitate marketing of clean pork in the existing markets in the urban areas of different districts 118 nos of pork vending cubicles will be established in the state. Priority will be given in Guwahati city where more than 150 vendors are operating. The pork vending cubicles with prefabricated structures or Stainless steel structure facilitate with Nylon cutting board, SS knife set, wash basin etc. the vendors will be trained under the project and after constant monitoring and certification by the peer monitoring mechanism the vending cubicles will be provided to the vendors. 20% of the total cost will be paid by the vendors and matching grant of 80% will be provided from the project in single trance

(w) **Food Safety and Public Health Issues: Risk assessment in pork value chain at program start and end**: Unhygienic and inefficient pig production practices coupled with poor pig slaughtering, handling, and marketing, as well as risky consumption practices pose risks to human health because of the high levels of microbes, parasites, mycotoxins and antimicrobials in pork. Poor practices also contribute to the transmission of deadly pig diseases such as classical swine fever. No adequate study has been conducted in the state to assess the risk/ hazard in pork value chain or to identify critical control points and risk mitigation/ management options. Generating this evidence would help to make interventions more evidence based, risk oriented and target group specific, which would ultimately help in judicious use of available financial and manpower resources. The study findings would also serve as baseline indicators of pork quality and safety that could be referred during impact evaluation study at the end of the project. **ILRI role**: Survey the human health risk (microbiological, parasitic, antimicrobial and aflatoxin) in pork value chain to identify interventions and at the end of the project to demonstrate impact. The laboratory work conducted will also serve to increase capacity in the AHVD laboratories. Deliverables: Risk assessment and impact evaluation report.

(x) **Assessment of human health risk in pork value chain**: In absence of government slaughter and selling infrastructure in most of the urban and rural markets, pigs are slaughtered inhumanly anywhere near the market without following standard pork production practices. Unhygienic and unscientific pig production practices coupled with poor pig slaughtering, handling, marketing and consumption practices posing a challenge to human health because of higher microbiological load, parasitic load, antimicrobial residue and mycotoxins in pork. Unfortunately, no major study has been conducted in the state to assess the risk/ hazard in pork value chain and to identify critical control points and risk mitigation/ management options. Therefore, it is proposed to conduct a risk assessment study throughout the pig value chain to identify the risk and their critical control points and to suggest customized intervention to reduce the risk. This would help to make interventions more evidence based, risk oriented and target group specific that would ultimately help in judicious use of available financial and manpower resources. The study findings would also serve as baseline indicators of pork quality and safety that could be referred during impact evaluation study at the end of the project.

(y) **Assessment of knowledge, attitude and practices (KAP) of value chain actors and economics of current business operation:** Motivation and capacity strengthening of pig value chain actors are important to increase productivity, reduce transmission of diseases, improve pork quality and safety, and to increase consumers' satisfaction and demand for pork. To make the motivation and capacity strengthening programme more target group specific, need based and user friendly, it is important to understand the prevailing knowledge, attitude and practices (KAP) of market actors and to compare the same with the required/ standard KAP practices. The difference will indicate the knowledge gap that we are to meet. Therefore, it is proposed to conduct a KAP survey to assess the training need and make training more context specific, need based and outcome oriented. The study would also assist in the designing the training implementation plan by supplying information on preferred time, venue, motivating factor, expected output of the target groups. In addition, the findings would help to

determine the performance indicators in term of knowledge, attitude and practices that could be verified at the end of the project by repeating the same baseline.

(z) **Tools for peer evaluation of training program pork food safety:** The benefits of training fade unless there are systems in place to reinforce good practices. To this end, training will be monitored at two levels. Knowledge and attitude will be assessed before and after training and intermittent monitoring will be continued for six months for ensuring adoption of improved practices. The second level of monitoring will be more intensive and action oriented. Towards this, immediately after training, a Pig/Pork Monitoring Committee (PMC) will be constituted among the trained actors to monitor the adoption of improved practices taught in the training by the fellow farmers/ traders/pork retailers using a simple monitoring tool to be developed by ILRI. This will be a simple tool to assess adoption of practices in terms of 'Yes' or 'No' and if 'Yes' what is the degree of adoption (ranked 1-5). The monitoring committee will monitor fellow members at least once monthly and submit the results to the project officials for second level of monitoring and verification using the same tool. Project officials would take action as needed and the process would be repeated several times in a span of six months. All successful adopters will be awarded with a training certificate in a ceremonial distribution event to be attended by senior government officials as a mark of appreciation and honour to the successful trainees. The list of trained value chain actors would be forwarded to Municipal Corporation/ FSSA for issuing (or renewing) trade license/registration. List of all trainees with contact details and photograph will be advised to record and keep in hard and soft forms for future use**. ILRI role**: Designing monitoring system, tools for monitoring and guidance on documenting monitoring outcomes. Deliverable: Monitoring design and tools.

(aa) **Technical support for establishing quality and safety procedure in laboratory under food safety laws:** To follow food safety regulation (FSSA 2006) it is important to test pork samples traded by pork slaughterers/ retailers periodically for checking quality and safety. In order to do so it is critically required to improve the lab infrastructure of the head quarter and the district offices under Vety. Deptt. It is proposed to provide technical guidance to the department in strengthening laboratory infrastructure and design and develop standard protocols for laboratory work and to put in place a quality and safety procedure. Also, it is proposed to train the Food Safety Officers and lab technicians on day to day lab work. **Role of ILRI**: Guide in strengthening laboratory, develop standard protocol and practices for laboratory work and impart training to Food Safety Officers and laboratory technicians. Deliverables: Copy of protocol and practices, list of trained Food Safety Officers and lab technicians.

(bb) **Drafting of content for consumers awareness and piloting some consumers awareness programme:** Consumer's awareness building is important to educate them about the good and bad quality, improve handling and cooking practices, reduce further deterioration of pork quality, reduce transmission of pork borne diseases (eg. CSF), reduce microbial load and chances of transmission of zoonotic pathogens and to improve consumers' satisfaction and behaviour. This would help in creating a demand driven production and marketing system that would help in regularizing the pork market, as well as protecting consumers from disease. Toward this, it is proposed to help the department by developing content for consumers' awareness and piloting some of the awareness programme like demonstration of good and bad quality pork, series of lectures in schools, exposure trip, art competition/debate competition among school children etc. **Role of ILRI**: Content development for consumers' awareness and facilitate training for govt. Officials. Deliverables: Content for consumers' awareness and list of trainees.

(cc) **Marketing Pilot programme for Guwahati city to streamline the meat trade**: To start with the activities of organizing the meat trade in proper scientific manner complying food safety norms, area linking the production clusters situated around the city to the centrally located slaughter house of

ALPCo located in Panjabari area and linking the forward linkage to the retailers of the city. The entire value chain is proposed to be stewarded by ALPCo under the project which oversees the scientific production, transport, slaughtering, processing, transportation to retailers and cold chain maintenance. Being a sister concern of the AHVD it also have assess to the network of field veterinarians located at rural areas around Guwahati to look after the health care services of the farmers of the production clusters. The proposed activities to be undertaken under the pilot project are: –

- Generation of public awareness on clean and hygienic meat.
- Generation of awareness and skill development among production clusters around the city about the scientific market led production, importance of stunning and hygienic slaughtering, cold chain maintenance etc.
- Awareness and skill development of butchers, traders, transporters of the city for proper meat handling and transformation of the vendors towards clean milk handling.
- Liaising with GMC, Police deptt., Health, AHVD and Food safety officials for co-coordinating & monitoring of the entire trade. If necessary the public administration will be induced to enforce strict measures to comply FSSAI norms as well as the Guwahati Municipal Corporation Slaughterhouse Bye Law-2012.

181. Institutional and Implementation Arrangement

Sl.	Deptt. / Institutions	Responsibilities
1	Animal Husbandry & Veterinary Deptt:	1. Health care & management support service to production clusters.
		2. Oversee the Breeding front of the state.
		3. Moderate the policy and regulatory reforms for improved piggery value chain
		4. Implementation of Food safety regulations in coordination with Local authority.
2	Assam Livestock and Poultry Corporation Ltd.	1. Production of breeding stock in collaboration with PPP
		2. Micro & Small Enterprise development in pig subsector.
		3. Organize the Post harvest management –Processing, marketing, value addition etc
		4. Implementation of low cost slaughterhouse for primary processing and clean pork production.
		5. Forward and backward linkages of the production clusters.
3	National Research Centre on pig, ICAR Rani.	Knowledge partner and expert services in
		1. Breeding front
		2. Nutrition.
		3. Post harvest technology HACCP etc
		4. Capacity building of value chain actors for better production, value addition and marketing
4	International Livestock Research Institute	1. Knowledge gap assessment of all the stakeholders.
		2. Customized designing of the training materials .
5	NGO (SP)	Aggregation of Farmers, formation of FIG, Formation of FPO
6	FPO/ FPC	Operation of CSC

182. Risk and Mitigating measures

SL.	RISKS	MITIGATION
1	lack of high quality boars	• Several strategies to produce boars including multiplier herds and use of AI
2	Outbreak of diseases	• MOU to supply CSF vaccine with private partner
		• Effective control and eradication of pig diseases.
		• Documentation and control of epizootic and zoonotic diseases. Knowledge up gradation among field veterinarians
3	Food safety measures fail to be adopted	• consumer awareness campaign will create demand for hygienic pork and purchase only from trained and certified market agents (eg butchers)
		• Technology for back tracing origin of meat will enable those failing to adopt, to be identified and appropriate action taken.
4	Lack of quality feed	• Novel feed technologies and feed additives, supplements and feed components, inventory of feed resources
		• Development of low cost pig ration with locally available feed stuff
5	Delay in formation of FPOs and their subsequent activities	• Experiences gained during last project could be utilized. A service provider is proposed for various activities from group formation to overseeing the execution of activities

183. Summary of Indicative Costs:

Particulars	Cost Rs. Lakhs
A. Productivity Enhancement	432
B. Breeding Program	1,094
C. Credit Linkage	3,518
D. Marketing	929
E. Support For Health Risk Assessment and Risk Communication	184
F. Operational PIU	736
Total	**6,894**

Note: Cost for Cross cutting common activities are incorporated in other sub-components.

184. Production Clusters for Pig Sector:

DISTRICT	Dev. Block	Cluster (Min 100 families)	Villages	Approx Pig rearing family	Approx. pig population	Major Linked Market
Golaghat	Dergaon	Dergaon	Bahgani, Bohikhuwa, Dhemaji, Dani Chapari	260	650	
	Gomariguri	Gomariguri	Adarshgaon, Kalajar	150	375	Gamariguri,
	Bokakhat	Bokakhat	No-5 Da gaon, Chapari gaon	120	300	Behora
	Sarupather	Sarupather	Khanikar, Nagajal , Kharua, Naharbari	265	663	Barpathar
	Bokakhat	Bokakhat	Bohikhowa, Bhelaguri, Jugalati, Dergaon	294	735	
	Marangi	Marangi	No 1 Rongbong, No 2 Rongbong, Letekuchapari, Borboria	260	650	
Jorhat	Ujani Majuli	Ujani Majuli	Thakurchuti, Koliagaon, Nagaochuk, Karkichuk,Rangachahi,swarnasri,Borpomua, Kumarbari, Cherepai, Majdeuri, Ratanpur miri, Gajera, Sonowal Kochari, Luitporia, Sriram, Ratanpur gayan	5750	14375	Jengraimukh,
	Dekorgarha	Dekorgarha	Bahphala, Upardeuri, Namdeuri	320	800	
	Majuli	Majuli	Uparsumurimari,Lowarsamurimari,Kaniajn, Hokonamukh, Upper Sonowal, Baligaon,Jharonigaon, Derghergaon, Randhanichuk, Bahbora, Morituli, Sonapara, Putuki, Tmuloni, Akholachuk, Charighoria, Mohorichuk, Malapindha, Borgoyan - 3, Borgoyan - 2, Borgoyan - 1, Sitadar, Gotiamari, Dhopatgaon,	4128	10320	Borgoya.
Barpeta	Bajali	Bajali	Palah, Upornoi, Dubi, Borshahan, PubRehabari, bandhe sidhani, garh, Saradhara, Goremari	1195	2988	Barama
Lakhimpur	Narayanpur	Narayanpur	Kinapathar, Majorchapori, Panbari Missing gaon, Bahgora Deuri gaon, Dhunaguri missing gaon	850	2125	Harmutti
	Ghilamora	Ghilamora	Bakula Maghuachuk, Arengiaboragaon, Ubhota sampora	230	575	Ghilamara
	N Lakhimpur	N Lakhimpur	Kuwarigaon, Boisagaon, Ahuchaulgaon, Bogolijan, Changmaigaon	377	943	Lakhimpur
	Boginodi	Boginodi	Majgaon, Harionigaon, Honpur	247	618	Boginadi
Morigaon	Bhurbandha	Bhurbandha	Patidoya, Ouguri, Moinagaon, Bhurbondha, Khatabori	480	1200	Morigaon
	Kapili	Kapili	Pachim Nagaon, Konabori, Pharanhkuchi, Thekeraguri, Ahatguri	243	608	Jagiroad
Darrang	Kalaigaon	Kalaigaon	Akelabari, Bahjani, Durgagaon,	341	853	Kolaigaon, Ramhari
	Pachim Mangaldoi	Pachim Mangaldoi	Medhipara, Bezpara, Gelaidingi, Chamuapara, Daha, Barangabari, Kachamari, Adhikari, Moza chuburi, Barhampur, Nagaon, Kuiyapani, Saruthekerabari, Borkumarpara, Pakabangipara, Bhalukkhowapara, Borthekerabari, Chelengeliapara, Kamarpara, Konwarpara, Baniyapara,	562	1852	Bongalgora
	Sipajhar	Sipajhar	Khatara, Khasdipila, Nagaon (Hatimuria), Dagiapara, Kamargaon, Mahuripara, Bamunjhar, Mahtoli, Kahotoli,	453	1476	Baminjhar
Sonitpur	Borsala	Borsala	Natun Chingri, Nambogoribari, Borigaon Kamarchuburi	152	380	Borsola
	Dhekiajuli	Dhekiajuli	Bhekerigaon,Chenga, Hiloi, Ghagrakochari	537	1343	Dhekiajuli
	Rangapara	Rangapara	Kheronibasti	61	153	
			kerabasti	72	180	
	Balipara	Balipara	Baligao Miri, Bokagaon Miri, Mulangaon, Amloga	818	2045	Balipara
	NA Duar	NA Duar	Bongaon, Khristan Basti, Bordikorai, Toubhanga, Bheleuguri, Patharbasti	823	2058	Bordikrai, Toubhanga,
	Sakomatha	Sakomatha	Majuligarh, Dhuli, Dihingpathar, Kherbari, Missamari, Karbi Block, Nihansang, Selaikati, Joypur	823	2058	
	Baghmara	Baghmara	Monabari basti, Bihapukhuri kachari, Dishiri, Bamgereki, Dagereki, Lahorijan, Rongajan, Naharbari, Birijan, Kalahandi basti	490	1225	
	Bihali	Bihali	Maghi, Padum Pukhuri,Borajuli,Singimari, Kachamari, Natun Chang, Kalaguri Jarani, Bihmari Jarani, Bihmari Boragaon, Bihmari Thandapani, Nanke Bihmari, Borajuli TE, Bedeti TE, Lalpukhuri,	512	1536	Bedeti, Borgang
	Chayduar	Chayduar	Joriguri, Mukaligaon, Aribhanga pathar(Mayang), Phatiabari, Benugaon, Arakhuti, Lepetpara, Balijan, Laudangia	670	1675	Gohpur
Goalpara	Rongjuli	Rongjuli	Maslam, Kurihamari, Kothakuthi, Ambuk, Khutabari, Kahibari, Khilamara, Simlitola,Sardarpara, Gathiapara Dhanudbhanga ,Salpara, Patpra	1418	4254	Dhupdhora, Rongjuli
	Kuchdhuwa	Kuchdhuwa	Khara Medhipara, Kuchdhuwa, Sessapani, Kaljhar	462	1386	
	Balijana	Balijana	Rampur, Agia, Dakurvita Goalpara, Rakhaplara, Sarapara, Ketekibari, Dariduri, Bodamal Rongsai, Kuruabhasa, Ananda Bazar, Makri	1385	4155	Agia, Balijana

DISTRICT	Dev. Block	Cluster (Min 100 families)	Villages	Approx Pig rearing family	Approx. pig population	Major Linked Market
	Lakhipur	Lakhipur	Kalyanpur, Baijuri, Bolaikhamar, Bordol, Pukhuripara, Boro Singri, Lakhipurtown, Bhalukdubi	1091	3273	
Nalbari	Borigog & Bongaon	Borigog & Bongaon	Mahima, Shantipur, Sateribari, Dhamdhama,Balitera, Naharbari	364	911	Dhamdhama, Barama
Karbi Anglong	Bokajan	Bokajan	Kachari gaon, Mainapuri, Bormanthi	236	590	
	Lumbajong	Lumbajong	Nepali Basti, Adorsho, Bhetagaon, Dimaidi, Nagachang, Hidim Teron, Upper Ekorani, Lower Ekorani ,Dhansing Teron, Rongnokse, Hondem timung Arong, Phonglangso, Rongchingri, Rongchingdon, Kakati Ronghang Arng, Hemari Ronghang Arong, Mensing Ronghang , Arong, Serlongbi, Beltola, Rongkhelang Jensing Timung Arong	2372	5930	Diphu, Manja, Dhansiri.
	Howraghat	Howraghat	Bongtok Terang , Kumoi Ronghang, Habe Kathar, Patar Timung, Sikaripathar, Sikarigate, Sikarighat Dimasagaon, Jiteplong, Mohiram Taro, Patradisha, Sarsing Engti, Baliram Engti,Kehai Kro, Langchitim, Pan Engti , Rongmili, Bura Kiling, Long Terang, Baligaon, Rongkhot Harijon Basti, Rongkhot Chauhan, Kalai Gaon - 1, Kalai Gaon - 3, Bali Gaon , Hongkram	3066	7665	Hawraghat
	Rongkhang	Boithalanso	Edenbari, Mahajan Timung, Ambinong, near Saturday market, Porbot, Near New Market, Umteli, Near Old Market.	585	1463	
	Amri	Ulukunchi	Birsinki, Umpenai, Ulukunchi	461	1153	
	Silonijan	Silonijan	Kathkatia, Dihingia Gaon, Aturkimi, Sardeka, Langsomepi, Zing Basti , Panika Gaon, Silkhuti	949	2373	Silonijan
	Socheng	Kheroni	Rikangmihong Pt - 1, Rikangmihom Pt - 2 , Phelangpi, Priloo Makum, Durbintila, Rangmili	624	1560	
Kokrajhar	Kokrajhar	Kokrajhar	Kathalguri - 1, Kathalguri - 2, Bangladuba, Titaguri - 1, Titaguri - 2, Halowador, Magurmari Kumguri	362	905	Kokrajhar, Titaguri
	Dotoma	Dotoma	Nalbari, Belguri, Dhupguri, Saraguri, Pachim Patgaon, Borsijhora Part - 2, Batabari, Bonshigaon, Lokhnabari, Aflagaon, Banargaon, Ghoskata, Hogmabil, Habrubari no 1, Habrubari no 1, Gossainichina	1163	2908	Dotoma
	Gossaigaon	Gossaigaon	Chekadani, Gambaribil, Raikhumbari, Boirali, Bhumka 1, Bhumka 2, Chakma, Thuribari, Sukanbaonai, Satyapur, Mohanpur, Restekpur(Bhairiguri), Dawaguri No1, Alokjhar, Gorjan no 1, Koklingbari, Kamalsing, Rajapara, Thuribari	989	2473	Gossaigaon
	Debitola	Debitola	Debitola, Gambhirkhata, Bashijhora, Kazigaon, Alupara	232	580	Debitola
Sivasagar	Khelua (Lakowah)	Khelua (Lakowah)	Afala Missing, Majarbari &Ligiribari, Boloma Missing, Lepai Chumoni, Dimowmukh, Garbhaga, Chenimora, Dighol Dorioli, Bhadhara, Betbari 2 No. Konwar, Nowjan, Tamulibazar Changmai, Khamun, Khanikar , Khelowa, Robi Gaon, Mout Moupiya, Borpatra, Bokabil, Da-Gaon, Melamora, Betonipam, Jatipotia, Dowari Gaon, Gandhia, Bakal, Lebang, Hahchara Chetia, Nimaijan, Naga Gaon, Choulkara, Moran Gaon, Haripara Ali Kochari, Bam Gohain, Jabalating Chetia, Konwar Gaon, Boiragibor, Bailung Gaon, Kohar Gaon, Punibil	5793	16894	
	Gaurisagar	Gaurisagar	Rupohimukh Mising, Jonmiri Borgaon, Thekaratol , Teliadunga	693	1733	
	Demow	Demow	Tetaliguri, Bamrajabari, Kotiori, Dolopani, Dhaibari, Balikur, Samukjan, Milonkur, Borchumoni, Tengapani	1940	4850	Rajmai
	Disangpani (Sonari)	Disangpani (Sonari)	Solmari, Borpathar, Dakshin Borpathar, Maj Pathar, Khoumtai Vill., Balikhuti Gumutha, Rangoli, Hajua jungal Block, Changmai Gaon, Moudumoni , Tifuk Kochari, Doba Grant, Lukurakhan, Porosani Habi 1 &2, Chengalimora, Mahmora Konwar, Jajali, Borchohoki, Borbil, Ram Nagar, Nirmolia, Desaw Botuwa , Kurukani Deori, Erabari , Khaloi Ghugura, Borahigaon, Bahboria,Rajapathar Raidongia, Lalati Pathar, Abhoipur Changmai Gaon	4533	11333	Sonari
	Sapekhati	Sapekhati	Nagahat, Dhadum, Kolakata, Kolakata Gohain, Moranhabi 1, Moranhabi 2, Dabaluhabi, Garkush, Bheshelipathar, Ghalaguri	1182	2955	
	Nazira	Nazira	Santak Bor Mising, Bali Gaon, Tipomia, Soladhara, Pahuchungi Deodhai, Senbessa , Henor Ali, Namati Joy Khamdang, Raboti Kopohuwa , Habi Gaon, Lahon Gaon, Singhibil, Napam Barutia	1771	4428	Simaluguri
Kamrup	Rani	Rani	Andherijuli , Sajanpara, Rajapanichanda, Hakakhabari,Rangapara, Bahupara, Puransukurberia, Belguri, Garopara, Joypur (F.V), Tanganpara, Salser, Patgaon, Umsor, Muduki , Kutalpara.	1470	3675	Lokhra
	Boko	Boko	Narenga, Alekjuri, Pairenga, Jarisatra, Bhehua, Kaithpara, Bondapara, Khatajuli, Sakhati-I	550	1375	Boko, Gobardhana,
	Bangaon	Bangaon	Niz Bogai, Nilaghat, Ouphula, Phalaphang, Choudhurypara, Tarabari- I, Tarabari- II, Chatabari, Lakadubi, Ranibhitha.	370	925	Beltola
	Rangia	Rangia	Bishenella, Halikuchi, Kekohati, Khoponikuchi, Tulsibari, Jaljali, Doloigaon, Balagaon, Septi Nakul, Bangalikuchi, Boangaon, Dahara, Maranjana, Bormurah, Balisatra, Lassi- Bishnipur, Sundhia, Kanikuchi, Baranghati, Bhaira, Dimu - I, Nakuchi, Bor Lechakona, Uttar Bordol, Dakhin Bordol, Gosain Solmari, Kachari Solmari	415	1245	
	Dimoria	Dimoria	Batakuchi, Kurkuria, Topatontoli, Ghagua, Belguri, Sagoligaon, Jhargaon, Goriaghuli, Mahmora, Urol, Erabari, Samota, Diksak, Rewamaheswari, Rewagaon, Dapata, Hirapara, Borobasti, Madhaya Malaibari, Keotpara, Barpak, Barghuri, Pub Malaibari, Ozari-1,2 &3, Gaon Dimoria, Niz-dimoria, Dhupguri, Bahtola, Na-kuchi, Borbitoli, Sitalkuri, Deulguri, Belguri, Khaloibari, Bhoregaon, Tegheria, Langchung, Latabari, Rajakhat, Lofar,	2771	8313	Sonapur

DISTRICT	Dev. Block	Cluster (Min 100 families)	Villages	Approx Pig rearing family	Approx. pig population	Major Linked Market
			Amguri, Dhemai, Fulung gaon, Moupur, Lahari, Luri, Bhumgaon, Laflong, Khulabari, Bhakua, Borkuchi, Rongdoloi.			
	Chaygaon	Chaygaon	Batakuchi, Ratanpur, Phalaghat, Rehabari, Jogibari, Dakowapara, Patgaon, Borjhar, Khalbakhal, Moinapara, Ouguri, Hatigarh, Sanyasi, Bherbheri.	660	1932	Chaygaon.
14	**56**	**56**		**59390**	**155986**	**44**

185. Sustainability: The activities will be sustainable beyond the project period as

a) The production of the sub-sector become organized and the scale of operation as an institution become sustainable through infusion of modern technology in production as well as other support services at door step.

b) Establishment of Local Service Provider (Pig-Bondhu) on fee for service basis for necessary grass root inputs and services delivery like AI, Community Boar programme etc.

c) Farmer skills training

d) Consumer awareness will create future demand for hygienic, quality pork

e) FPOs formed during the project will handhold and support with necessary mentoring for continuous functioning.

f) CSCs will link up the clusters to relevant institutions for necessary technical updating and financial services and operate as an enterprise model.

g) CSC /FPO act as guarantor and will coordinate with the financial institutions for continuous handholding of the production cluster members and ensure financial cushioning of the farmers of the cluster.

h) Value addition of the produces through organized processing by the entrepreneurs.

i) FPO will coordinate with the market related information.

186. Results Chain & Results Framework: Outcome of the intervention- Intervention of the project in this sector would yield some definite outcome which may be as increase in the income of the farmers, reduction in post harvest handling losses etc.

(a) **Results Chain**

Sl	Activities	Sub activities	OUTPUT	Outcome
1	**PRODUCTION ENHANCEMENT**			
1.a.	**Aggregation of farmers for formation of FIG and cluster**	Sensitization of the clusters for formation of CIGs		
	Engagement of NGO for formation of CIGs	Identification of an NGO and have contract agreement with it for formation of CIGs.	Contract for engagement of NGO.	Increased production volume leading to economic growth
	Formation of Common Interest Groups (CIG)	Aggregation of farmers and formation of CIG to group into a commercial entity for increasing production volume of the group	No of CIG formed	
	Formation of FPO			
		Sensitization of the clusters of a specified area for formation of FPO /FPC	No of FPO formed	Profitability enhancement of the farmers.
		Facilitation for registration of FPO/FPC		
		Mentoring and handholding of the FPO/FPC .		
1.b	**To enable Traceability by Tagging and database recording**			
	Development of MIS for data management on farmer registration, breeding records and marketing.	Identification and contract agreement with service provider for development of MIS	Contract for development of MIS with an identified service provider company.	Reduction of unhealthy practices of production like unscrapulous use of antibiotics, medicines, growth promoters etc

Sl	Activities	Sub activities	OUTPUT	Outcome
		Development of MIS for online data management	MIS in place to be installed in the data entry devices.	
	Tagging of animals & registration	Procurement of tag applicator (2/cluster)for ear tagging	No of Tags applicators procured	
		Procurement of ear tags	No of ear tags procured.	
	Registration of farmers	Printing of Registration form for owner	No of farmers registered.	
1.c	**Demonstration & Training of farmers on Climate resilient Housing system**			
	Selection of farmers for demos	Fixation of criteria for selection of farmers and	No of selected farmers for demos on housing	Decrease incidence of disease and increase productivity.
	Demonstration for Breeders	Demonstration for Slated floor housing	No of Demo on Slated floor for Breeders	
		Demonstration for Bokashi Piggery type housing	No of Housing demo for Bokashi Piggery for breeders	
	Demonstration for Fatteners	Demonstration for Slated floor housing	No of Demo on Slated floor for Fatteners	
		Demonstration for Bokashi Piggery type housing	No of Housing demo for Bokashi Piggery for Fatteners	
		Field day	No of field day organized	
1.d	**Improvement on Feeding Management for increased production and decrease deficiency**			
	Analysis of locally available feed ingredients for economic ration computation.	Contract with NRC for conducting Feed analysis	Contract in place.	
		Feed analysis of the locally available feed resource & preparation a database for ration balancing	Data base on Locally available feed resources	Increased productivity Scope for enterprise development for feed manufacturing
	Demonstration on Ration balancing	Demonstration on ration balancing showing recommended rations for Piglet, Boar, Sow and fattener in relation with Different breeds and age groups.	No of Demonstration done.	Reduction of cost of production & decrease in deficiency disorders
		Field day	No of field day organized	
	Sourcing strategy of Feed			
	Method demonstration for improvising local food feed crop	Demonstration of simple technology for improvising of food feed crops by minimal processing (Silage making)	No of silage unit demonstrated.	
	Establishment of linkage of farmers to feed producers	Contract with Major feed supplier/ manufacturer with the CSCs for supply of required quantity of conc feed for the cluster members.	Contract with the feed producers(ALPCO/ Private player)	
	Establishment of linkage of farmers for supply of feed additives	Contract with Manufacturer/Supplier for Iron supplement for Piglet	No of Iron supplement doses supplied.	
1.e.	**Improvement on Breeding practices among farmers for better productivity**			
	Formulation of Breeding policy	Preparation of a draft Breeding policy	Comprehensive evidence based region specific Pig Breeding policy	
	Capacity enhancement of Nucleus Breeding farm			
	Induction of Purebred animals for the nucleus farms	Identification of the farm maintaining pure breeds in /out side the state and contract with them for supply of the pure breed animals for the Nucleus farms of the state.	Contract with the leading farms for supply of pure breeds.	1. Increase in productivity . 2. Reduction in inbreeding depression . 3. Encourage private sector initiative for development of more Multiplier farms.
	Capacity enhancement of the existing farms with inducted purebreed animals.	Induction of purebreed animal to the 2 presently operating farms having animal.	No of aniomals inducted	
	Operationalization of the 2 newly constructed farms under AHVD	Identify a Private breeder and Contract to operationalize the existing ready infrastructure of AHD	Contract signed with the Private breeders.	
		Induction of purebred animal to the presently non functioning farms having Infrastructure.	No of Purebreed animals inducted in the Farms.	
	Supply of purebred piglets from the Nucleous farms to	MoU with the AHVD for supply of the pure breed animals from the 2 farms for the multiplier farms	No of pure breed pigs supplied to the multipliers	

Sl	Activities	Sub activities	OUTPUT	Outcome
	Multiplier farms.			
	Development of Multiplier farms	Identification of Multipliers & Breeders to supply CB animals to the farmers.	No of Multipliers identified and contracted.	
	Establishment of linkage of Multipliers to the Nucleus farms	Contract the Nucleus farms to the Multipliers through the CSCs for supply of Purebred piglets from Nucleus farm to Multipliers	Contract in Place and no of Multipliers linked to the Nucleus farms	
	Breeding activity at Farmers level			
	Induction of Community Boar	Contract for supply of CB animals to the farmers as Community boars.	No of CB animals supplied to the farmers as community boars	
		Crossbreeding by Community boars at farmers level	No of piglet produced	
		Introduction of community boar at cluster level with 6 month feeding	No of community boars supplied	
	Establishment of AI service at farmers doorstep	Contract with NRC pig for supply of Semen doses of improved purebred Boars	Contract signed and no of doses of semen supplied.	
	Implementation of Performance recording system	At Nucleus herd level, Multiplier level and farmers level.	Formation of database on Breeding activity records.	
1.f	**Establishment of Common Service Centre**			
	Engagement of staff at CSC	Identification and engagement of a Cluster coordinator	Engagement of Cluster coordinator	Enhancement of better input supply leading to increased trade volume.
	Infrastructure development in CSC to cater feeding needs	Infrastructure for Godown for feed, Min Mix, Medicine etc.	Construction of Godown	
		Installation of Mini Feed Grinder and Mixture	Installation of Grinder and Mixture.	
	Infrastructure development in CSC to cater Breeding(AI service) needs	Solar cum Electrically operated Refrigerator for storage of liquid semen.		
		Disposables for AI services(Gloves, Sheath, catheter etc)		
		Contract with the Private players for supply of disposables		
	Infrastructure development in CSC to cater Healthcare needs	Solar cum Electrically operated Refrigerator for storage of Vaccines and medicines.		
	Installation of computers and acessories at CSC level to enable traceability from production to marketing	Procurement of data entry device(Computers and accessories) - at data entry point (CSC of Cluster/FPO)	No of computers installed at CSC level	Improved traceability.
1.g.	**Adoption of animal health measures for increased productivity and reduce mortality as well as Zoonotic issues**			
	Supply of CSF vaccines	Contract with the Vaccines suppliers for supply of CSF vaccine and FMD vaccine.	Contract for vaccine procurement with Production house and no of vaccine procured .	
	Supply of deworming doses to prevent cysticercosis	Contract for supply of Deworming medicines	Contract in place and no of deworming doses procured.	
1.h	**Capacity Building for value chain actors for productivity enhancement**			
	Training policy formulation	Preparation of a draft Training policy	Training policy	
	Customized Content development for training	Manuals for Farmers,(Breeders & Fatteners)	Training Manuals for Farmers,	
		Manuals for PigBondhu	Training Manuals for PigBondhu	
		Development of training manuals for Project officials.	Manuals for A.H.D. Project Officials(TOT for Pig Bandhu, TOT for housing and Management, Key Extension people.	
	Conduction of Exposure visit for Project officials	Exposure visit to the Veterinary Block Officers under project district.	No of Exposure visit.	

Sl	Activities	Sub activities	OUTPUT	Outcome
	Conduction of Exposure visit for selected farmers	Fixation of selection criteria for selection of farmers for exposure visit.	Selection criteria for exposure visit.	
		Selection of farmers giving preference to the successful farmers from AACP	No of farmers selected for exposure visit.	
		Exposure visit to the selected farmers	No of farmers went for exposure visit.	
	Training of farmers on Housing & management	Selection of farmers for training on housing	No of farmers selected for training on Housing.	
		Training of Farmers for fatteners, breeders, bokashi	No of farmers trained at NRC	
	Training of Local Service Provider(Pig Bandhu)	Development of criteria for selection of Local Service Provider(Pig Bondhu)	Selection criteria for selection of Pig Bondhu	
		Selection of a local Service Provider (Pig Bondhu) at NRC for AI, Feeding and Management.	No of Pig Bondhu selected for training	
		Training of a local Service Provider (Pig Bondhu) at NRC for AI, Feeding and Management.	No of Pig Bondhu trained at NRC	
	Support to the Local AI worker/ Pig Bandhu. (Equipments for AI)	Procurement of AI Kit, Uniforms	No of Kit provided	
		Procurement of Tablets	No of Tablet Provided	
	Awareness generation among farmers on breeding , management and diseases.	Organization of monthly cluster level meeting for sensitization on Breeding, feeding, management, Zoonotic diseases and credit linkage with financial institutions.	No of meetings convened.	Productivity enhancement and reduction in mortality. Reduction of zoonotic issues.
1.i	**Credit Linkage**			
	Awareness generation on credit linkage with financial institution	Awareness of community on opening of bank accounts, book keeping	1. No of credit linkage established 2. No of animal insured.	Production enhancement. Increased commercialization of the pig sector (enabled by increased production made possible in turn by) increased credit flow.
		Credit linkage, KCC etc		
	Awareness development on Risk Management	Convergence of various schemes i.e. NLM		
2	**AGGREGATION**			
	Creation of aggregation facility for the livestock markets to provide linkage with high volume traders with the farmers	Development of Infrastructure/ civl works for creation of lairage facility , animal shed, watering facility with drainage and weighing facility etc at the major 27 selected livestock markets for aggregation of animals.	No of markets developed with aggregation facility	Development of increased trade volume and better price realization mechanism.
3	**PROCESSING & VALUE ADDITION**			
3.a.	Identification of processing houses	Identification/Mapping of Existing Processing facilities of the state	No of small/large slaughter facility identified	
	Upgrading of the existing 1-2 pig small slaughter houses	Upgrading of 1/2 pig processors to 10pig/day processing	No of processing unit upgraded	
	Strengthening of existing processing house to meet the FSSAI norms.	Facilitation for aggregation, Lairage facility , Power back up, upgradation of infrastructure	No of large existing processing house strengthened	
		Addition of Secondary processing facilities		
3.b.	Facilitation of MoU of the production FPOs/CSCs with Large processing houses	Production clusters to be linked with Existing Large processing houses .	No of cluster/CSC/FPO identified for volume supply to the large processing houses - Arohan, Sonapur./NEC food processors at ALPCo, Khanapara/Nazira Pork processing plant	
		Contract agreement of the CSCs with the small processing facilities		
3.c.	**Capacity building of the output value chain actors on food safety**			
	Assessment of knowledge gap of stakeholders	Knowledge gap assessment of stake holders.	Knowledge gap analysis report	1. Increased adoption of the scientific and hygienic slaughtering process complying FSSAI norms 2. Optimum capacity utilization of the existing slaughter houses. 3. Minimum carcass wastage. 4. Improved self life of the

Sl	Activities	Sub activities	OUTPUT	Outcome
				meat products .Reduction in public health hazard related to meat trade. Enhancement of meat trade both in terms of profit and volume.
	Contract with NRC	MoU with NRC to conduct the TOT for Butcher training	Mou in place for training of TOT for butchers	
	Training manual development	Development of training manuals on Scientific primary & secondary processing	Training manual development.	
	Training of the TOT at NRC	Training of TOT at NRC for conduction of hands on training to butchers, traders, wholesalers and retailers of his respective area.	No of TOT for the Butchers, traders created.	
	Support to the butchers	Training kit for butchers	No of training kit distributed to butchers	
	Training of value chain actors of marketing by TOT at respective places	Training of trader, wholesalers and retailer /vendors at cluster level	No of Training of butchers at field level by the TOTs	
	Establishment of low cost slaughter house	Establishment of low cost slaughter house at cluster/FPO level/ Market place for demonstration.	No of Low cost slaughter house established.	
	Demonstration of structured hygienic meat shop	Demonstration on of structured meat shop at cluster/FPO level.	No of demo of structured meat shop	
	Slaughterhouse waste management			
	Streamlining the waste management of the major existing slaughter houses in PPP arrangement	Negotiation and procurement of PPP (Advertisement, Evaluation, selection and signing of MoU)	i. No of MoU signed with PPP for operating of rendering plant of ALPCo.	1. Reduction in Public health hazard from slaughter waste 2. Facilitation of recycling of waste products used for preparation of high quality feed ingredients for animals. 3. Scope for development of downstream enterprise.
		Procurement of waste transport vehicle to be operationalize under PPP		
4	**MARKETING**			
4.a.	Market assessment for identification of major market and aggregation points	Identification of Major markets linked with major production cluster.		
		Mapping of actors and volume with natural aggregation point	No of actors identified with quantity of pork dealt /each vendor and no of Aggregation points identified.	
		Assessment of minimum infrastructure in existing production linked selected major markets	No markets assessed in terms of infrastructure.	
4.b	Strengthening of major cluster linked markets for pork vending in hygienic manner	Designing the market sheds for major cluster linked markets for accommodation of 25 vendors (Average)	No of market design made.	
		Strengthening of the market sheds for major cluster linked markets by constructing of Market Shed for trading of pork with cutting cubicle, nylon cutting board, fly proof netting, portable water facility 25 pork vendors	No of major cluster linked markets constructed.	
		Construction of meat vending cubicles for trained vendors	No of cubicles made for transformation of vendors.	
4.c.	Linkage with high volume processing houses with out put chain(vendors)	Facilitating linkage and contract with high volume processing houses to the vendors for sale of the products in the market.	No of vendors linked with processing houses.	
4.d.	**Capacity building of vendors for compliance of FSSAI**			
	Transformation of traditional roadside pork vendors to licensed hygenic pork vendors	Training of traditional roadside pork vendors by TOTs developed by NRC	No of pork vendors trained	Increased demand for clean pork from a structured meat shop. Elevation of social status of the pork vendors.
	Monitoring / certification of local pork vendors after attaining training	Peer review group formation for periodic monitoring of the vendors on food safety.	No of Peer group for monitoring formed	
		Periodic/ sudden inspection by the local	Inspection of the vendors	

Sl	Activities	Sub activities	OUTPUT	Outcome
		authority.	by local authority	
		Handholding and liaising for obtaining licence for pork vending	No of pork vendors obtained license.	
4.e.	Facilitation for Export from the large production houses like AROHAN, NEC etc.	Facilitation of the Processing houses for obtaining Export License by NRC.	The Export license obtained	
5	**FOOD SAFETY & PUBLIC HEALTH ISSUES**			
5.a.	**Generation of consumer awareness strategy on food safety and Zoonosis**			
	Agreement for knowledge gap analysis and campaign material development	Contract with ILRI for conduction of gap analysis and development of communication strategy, development of awareness generation materials	Contract agreement with ILRI	
	Consumer Knowledge gap assessment & Designing of content for awareness	Knowledge gap analysis of the consumer, consumer behaviors	No of Knowledge gap analysis report	1. Increase demand for wholesome meat. 2.Greater consumer prefrence for structured meat shops maintained in hygenic manner. 3. Coordination of public with the local authority for prevention of roadside unhygenic meat trade and enforcement of food safety norms.
		Development of Communication strategy	No of Strategy document developed	
	Mass media campaign on food safety through electronic medium(TV)	Development of TV short ads , organization of talk shows etc	No of TV ads developed and showd, No of Talk show performed	
	Organization of awareness generation programme on food safety, FSSAI etc	Organization of Road show on food safety	No of Road show performed.	
		Organization of awareness among School children on clean meat and food safety	No of awareness programme organized in schools	
5.b.	**Constitution of a Joint monitoring committee to oversee the compliance of the FSSAI.**	Formation of District level Joint Facilitation and Monitoring committee	No of District level JMC formed	
5.c.	**Assessment of Human health risk**			
	Microbial risk assessment (at all levels from producers to consumers)	Random sampling of the meat samples for testing of presence of the residues.	No of samplings done on food safety.	
	Antimicrobial residue assessment (qualitative and quantitative)	Random sampling of the meat samples for testing of presence of the residues.	No of samplings done on food safety.	
	Testing for presence of Aflatoxin residues	Random sampling of the meat samples for testing of presence of the residues.	No of samplings done on food safety.	
6	**ENVIRONMENTAL ISSUES**			
	Popularizing Improved manure practice	Demonstration of Improved manure management practices in pig farming		

(b) **Results Framework**

	Cumulative target values							
Indicator Name	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**End Target**
Number of Demonstrations on Climate Resilient Housing Technology for Breeders and Fatteners(Number)	0	0	18	48	93	138	176	176
Number of Farmers Adopting Climate Resilient Technologies Demonstrated under the Project (Number)	0	0	120	420	1170	2370	3620	3670
Number of Pigs Produced for Breeding (Number)	0	0	2592	12960	33048	62856	100764	138996
Number of PigsProduced for Market as Fatteners (Number)	0	0	18144	90720	231336	439992	705348	972972
Kilograms of Pigs Produced ('000 kg)	0	0	1270	6560	17110	33180	54410	75820
Kilograms of Pork produced (assuming 60% as dressed weight) ('000 kg)	0	0	760	3940	10270	19900	32500	45490

Sub-Component C1.3.1: Milk Value Chain: Formal sector

187. Milk value chain: **Overview of the sub-component:** The focus of this value chain is productivity enhancement by organizing farmers into Milk Producers' Institutions (MPIs) that eventually will get registered as Dairy Cooperative Societies (DCS) and genetic upgradation of non-descript cows using AI, improved feeding through fodder production demonstrations, bulk supplements provision through DCS and by developing linkages with crop producers (e.g. maize, mustard, legumes for crop residue). A customized ration balancing program involving feed analysis and use of locally available resources would be delivered by mobile AI technicians. The project activities pertaining to Animal health such as vaccination campaigns for FMD and brucellosis, as well as testing and training on diseases like mastitis etc. shall be implemented by Department of Animal Husbandry and Veterinary (AHVD), Govt. of Assam. Animals inseminated under doorstep AI delivery services will be uniquely tagged whose information will be synchronised in Information Network on Animal Productivity and Health (INAPH) database developed and maintained by National Dairy Development Board (NDDB). The project will also install BMCs for handling increased volumes of raw milk procurement thereby giving bigger and better access of market to its dairy farmers. Besides BMCs would prevent the quality of raw milk, procured from villages, from being spoiled till it is transported to the processing plants. Solar powered data processor based milk collection units (DPMCUs) would be installed at each DCS to ensure transparency in milk reception, weight measurement and quality testing for making producers' payments. For promoting clean milk production and its hygienic handling the project will be allocating milking machines to its milk producers on a pilot basis. The project will be leveraging the liquid milk processing and product[28] manufacturing capacity of WAMUL. Under the project, WAMUL will coordinate with various training centers of repute to impart skill building in its milk producers besides mobilising the resources present within Assam. However, the milk producers in the informal sector will get continued to be trained by AHVD, GoA.

188. Background: In Assam, of the total volume of milk produced, around 60% gets consumed at the production level and only remaining 40% volume becomes available as marketable surplus, of which more than 90% volume is being collected by the players in the informal sector, mostly bulk aggregators locally known as "paikaria". Hence, the share of marketable surplus being procured by organised/ formal players such as various cooperative milk unions (WAMUL), other village level DUSSs and the Department of Dairy Development is restricted to less than 10% of marketable surplus.

189. Objectives:

a) improve productivity and profitability of small holder dairy farmers through formal sector and create jobs

b) Increasing productivity of milch animals through breed up gradation

c) Reduced cost of milk production by feed intervention programme

d) Providing transparent quality based remunerative pricing to the dairy farmers with direct transfers of milk payment to their bank accounts

e) Setting up of modern processing facilities and creation of a strong Cooperative brand "Purabi" to achieve significant value addition to the milk procured from dairy farmers

f) Creation of gainful employment in the formal milk sector

[28] Milk Products such as plain curd, sweet curd, paneer, cream, flavoured milk, ghee etc.

190. Challenges to be addressed in further developing dairying in Assam:

a) Widespread prevalence of low yielding non-descript cattle with a milk yield of less than 1 kg per day per animal due to low AI coverage as well as irregular supply/ non-availability of feed and fodder to dairy farmers and lack of heifer management.

b) The State is having districts where density of milk production is quite low which makes it unviable/ uneconomical for setting up necessary bulk milk cooling and processing infrastructures.

c) Undulating terrains of the State that has both low lying as well as hilly/ rocky lands due to which cultivation of fodder crops becomes a scarce phenomenon.

d) In the State the milk demand in major urban consumption centres are served by the milk production system located in the peri-urban areas of a big city/ town. However, the milk production systems of these peri-urban centres are largely dominated by collection agents who sell raw milk in loose form posing serious health risks to the consumers.

191. The way forward - Interventions proposed for bringing dairy development in Assam:

(a) Revival of the Cooperative Institutions: Although milk unions were established in the State at different points in time to provide the linkage between producers and the consumers, the institutions became defunct because of various governance and operational constraints. However, in the year 2008, Government of Assam took a decision to handover the management of WAMUL to NDDB at a time when the union was managing to procure only 400 kg of milk per day and selling only 700 litres of milk per day.

(b) Once the management of the Union was taken over by NDDB for revival it started to show good progress in terms of quality based price being paid to its dairy farmers and distribution of safe, hygienic and packed liquid milk and milk products to the various consumers in the State. As such the cooperative institution has now begun to take shape. Seeing the progress and effectiveness of the implementation methodology, the management of EAMUL and CAMUL were also handed over to NDDB for their revival in May 2016.

(c) The brand "Purabi": This intevention being a market led plan, various liquid milk marketing channels and routes will be developed connecting all possible urban agglomerations in the State in a viable manner. This will enable to develop and build a strong cooperative brand "Purabi" for selling scientifically processed, safe and hygienically packed milk and milk products across various civil and defence markets in the State and also in few of the other neighbouring States. A strong brand with well penetrated and wide-spread market would strengthen the position of milk producers.

(d) Following activities will be implemented under the project by WAMUL:

(i) Productivity enhancement: Delivery of services like Artificial insemination, cattle feed, feed supplements etc.

(ii) Village based milk procurement system with installations of bulk milk cooling units along with AMCUs and DPMCUs at MPI/ DCS.

(iii) Processing infrastructure: Expansion of existing liquid milk processing plant along with product making section at Guwahati and Setting up a new liquid milk processing plant at Jorhat.

(iv) Strengthening of marketing infrastructure & Brand "Purabi"

(v) Conducting capacity building training programmes for milk producers, village level functionaries, BMC and plant operators, marketing supervisors and executives / managers engaged in various project activities.

192. Details of the proposed activities to be covered under the sub-component :

(a) **Doorstep AI Delivery Services:** The key elements to prepare and execute a AI – doorstep delivery plan are concentration of Female Bovine population with a minimum of 250 cattle per Village, distance between adjoining villages, etc. A minimum of 2000 Female breedable cattle population to be spread across 7- 10 villages within a radius of 5-7 Kms to define the Cluster of the project area. From thirteen districts, 85 Blocks and 3360 Villages are proposed to be covered from a total of 12955 Villages based on the following criteria:

- The districts from where WAMUL already procures milk have been selected so as to focus on strengthening milk procurement activities in these districts.
- Blocks having per village Female cattle population of more than 250.
- Distances and conditions of the road for logistical convenience.
- Contiguity of districts has also been considered. Radius of the Cluster should be 5 -7 kms.

District wise breedable bovine animals to be covered				
Districts	**Area(Sq. Km)**	**No. of Villages**	**Villages to be covered(Nos.)**	**Breedable Bovine population available for AI in the Villages to be covered (in '000)**
Morigaon	1535	631	192	25
Nagaon	3898	1422	727	108
Kamrup	1020	1258	402	63
Barpeta	2645	819	330	52
Golaghat	3470	1077	228	23
Jorhat	2772	791	348	63
Sivsagar	2668	886	210	28
Sonitpur	5324	1833	206	31
Cachar	3786	1047	174	19
Goalpara	1824	763	30	3
Nalbari	2257	462	168	31
Lakhimpur	2277	1170	180	20
Darrang	3481	796	165	21
Total	**36957**	**12955**	**3360**	**487**
Assam	***74714***	***25124***	***13%***	***17%***
% share of Project Area	***21%***	***52%***	***26%***	***20%***

Note: An average of six months is considered for performance of new MAIT in the year of commissioning while projecting AI numbers as they would be deployed in batches throughout the year, 27 AI's per Centre per month for 1st year and 10% increase in AI's per Centre per year from 2ndyr onwards is planned.

Estimated pregnancies under the project								
District	**Yr-2**	**Yr-3**	**Yr-4**	**Yr-5**	**Yr-6**	**Yr-7**	**Yr-8**	**TOTAL**
Nagaon	13968	15365	16762	18624	20486	22349	24677	**132231**
Morigaon	3312	5069	5530	6144	6758	7373	8141	**42327**
Barpeta	1800	5040	7440	8976	9768	10824	11880	**55728**
Kamrup	1500	5040	8705	10934	11899	13186	14472	**65736**
Golaghat	360	1056	1814	2371	2554	2736	3101	**13992**
Jorhat	1200	3432	5645	7238	8074	8909	9744	**44242**
Sivsagar		528	1584	2184	2352	2520	2856	**12024**
Sonitpur		660	2189	3182	3427	3672	4162	**17292**
Cachar		612	2006	2923	3202	3480	3898	**16121**
Goalpara		132	288	312	336	360	408	**1836**
Nalbari	480	2006	3226	3494	3898	4301	4704	**22109**
Darrang		612	2280	3528	3864	4200	4704	**19188**
Lakhimpur		396	1296	1872	2016	2160	2448	**10188**
TOTAL	**22620**	**39948**	**58765**	**71782**	**78634**	**86070**	**95195**	**453014**

The project plans to provide doorstep artificial insemination services in around 3360 villages in 13 districts of Assam through 560 mobile AI Technicians (Including the under coverage districts of Nagaon and Morigaon). Services to be provided under Doorstep AI delivery services

(ii) To provide quality AI services, under the framework of Breeding Policy of Assam, at farmers' door step using semen doses from high genetic merit bulls available in the country aimed at producing superior calves with higher productivity.

(iii) To provide efficient service following Standard Operating Procedure (SOP) through well trained and qualified AI Technicians aimed at improving the conception rate and reducing the inter calving interval and increasing the productive life of the animal.

(iv) To provide infertility management support to dairy farmers aimed at reducing infertility problems in field and reducing 'inter calving period' thereby increasing the proportion of 'In milk' animals in a given year leading to increased milk production.

(v) To provide advisory services to farmers w.r.t to animal health, animal breeding and animal nutrition through Ration Balancing Programme for creating awareness about profitable dairy animal management

(vi) To capture and maintain the breeding data in INAPH of all the inseminated animals linked to unique identification number to determine 'reproductive efficiency' of bulls, cow and evaluate the qualitative performance of AI technicians, region and to implement management changes based on objectively gathered data.

(vii) Timely, hygienic and quality AI services at the doorstep of the farmers after ascertaining proper stage of oestrus using genetics sourced from 'A' grade semen stations though skilled and qualified AI technicians.

(viii) Ear tagging of inseminated animals.

(ix) '21 day' follow up service to alert farmer to observe for heat signs in inseminated animal in subsequent cycle.

(x) Pregnancy diagnosis of the non-return inseminated animals at the doorstep of the farmer after 3 months post insemination.

(xi) Calving follow up of the animals declared pregnant and identify female calves with unique number (ear tagging).

(xii) Providing infertility management services to farmers through qualified Veterinarian by way of organizing infertility camps in villages having higher incidence.

(xiii) Advisory services to the farmers on Animal health, breeding and nutrition during farmer contact meeting, film shows, health/infertility camps, and calf show through veterinarians

(xiv) Ration Balancing Programme (RBP) to be implemented in all AI centres

AI projections within the project period								
District	**Yr-1**	**Yr-2**	**Yr-3**	**Yr-4**	**Yr-5**	**Yr-6**	**Yr-7**	**TOTAL**
Nagaon	34920	38412	41904	46560	51216	55872	61692	**330576**
Morigaon	8280	12672	13824	15360	16896	18432	20352	**105816**
Barpeta	4500	12600	18600	22440	24420	27060	29700	**139320**
Kamrup	3750	12600	21762	27336	29748	32964	36180	**164340**
Golaghat	900	2640	4536	5928	6384	6840	7752	**34980**
Jorhat	3000	8580	14112	18096	20184	22272	24360	**110604**
Sivsagar	0	1320	3960	5460	5880	6300	7140	**30060**
Sonitpur	0	1650	5472	7956	8568	9180	10404	**43230**
Cachar	0	1530	5016	7308	8004	8700	9744	**40302**
Goalpara	0	330	720	780	840	900	1020	**4590**
Nalbari	1200	5016	8064	8736	9744	10752	11760	**55272**
Lakhimpur	0	990	3240	4680	5040	5400	6120	**25470**
Darrang	0	1530	5700	8820	9660	10500	11760	**47970**
TOTAL	**56550**	**99870**	**146910**	**179460**	**196584**	**215172**	**237984**	**1132530**

(b) **Animal Health:** The project proposes to cover animal health care services in areas covered by WAMUL as well as other areas through the network of AHVD, Govt. of Assam. Requirements for animal health aspects viz. animal health/ fertility camps, vaccinations and disease control activities have been assessed and included under the "Milk Sector module". The said section covers requirements specific to the areas covered by the formal sector/ WAMUL.

(c) **Animal Nutrition-Feed & Fodder**: Under the project, a special emphasis would be made on a systematic feed intervention for the crossbred milch animals to enable them to achieve their full genetic potential of milk yield. The feed intervention is popularly coined as "Ration Balancing Programme" (RBP) and will be focussing on balanced intake of locally available animal feed and fodder as well as intake of processed feed and other feed supplements based on the weight and lactation cycle of a particular milch animal.

(i) The intake of optimum feed quantity will be ascertained using INAPH software that remains pre-installed in the notebooks allotted to mobile AI technicians along with other accessories such as measuring tapes etc.

(ii) The plan envisages promotion of Balanced Cattle Feed and Feed Supplements usage by the producers as well as silage making. Few silage making units for demo purpose have been included under Milk – Formal Sector. The table below shows the quantity of cattle feed and mineral mixture to be sold in the project districts and also the no. of silage making units (demo purpose). Cattle feed & mineral mixture to be sold in the project districts & silage making units to be made (demo).

Sl.	Particulars	Unit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
1	Cattle feed with By-pass protein	MT per annum	437	1,745	3,971	6,513	9,077	11,334	13,600
2	Mineral mixture	MT per annum	33	131	298	488	681	850	1,020
3	Silage making units for demo purpose	Nos	12	25	27	20	12	3	0

(iii) The plan also envisages undertaking various activities to develop fodder production in the project area as a part of productivity enhancement. This Project (APART) being a comprehensive project encompassing activities related to agriculture, the fodder production related activities are kept in the scope of Agriculture Department (Detail is mentioned in C.1.1.)

(iv) Doorstep calf rearing: The project also envisages promoting an optimal level of nutrition in early life of calves born under AI that will trigger faster growth and early attainment of puberty. Calves should be reared carefully to obtain optimum gain in body weight, so that they attain about 70-75 percent of mature body weight at puberty. Poor feeding of young calves leads to higher age at first calving and overall loss of productivity in the life span. The calf starter should be fed for the initial period of 26 weeks from birth. The project aims to incentivise scientific feeding of newly born calves for initial few months through selected beneficiaries.

(d) **Village Based Milk Procurement Systems:** The plan envisages procuring around 200 Thousand Kg Per Day (TKgPD) of milk from the project area at the end of the seventh year. The achievement of this target is subjected to the adherence to proper implementation of project strategies. For achieving this target, it has been envisaged to establish 999 MPIs that will be covering around 45,000 dairy farmers. As the State is predominant with non-descript varieties of animals, the project through its AI delivery programme aims to increase the pouring from each dairy farmer from around 2.50 kg per day to over 4.00 kg per day by the end of seventh year.

(i) In view of the long gestation of the dairy cooperative societies to be formed, a new form of village based institutional structure was proposed after NDDB's takeover of WAMUL's management. The new institutional structure is in a cooperative form wherein Milk Producer Institutions (MPIs) are organised at the village level on the concept of cooperation initially bringing around 15-20 milk producers with shared concerns and mutually agreed goals. The milk producers generally select a person either among themselves or from the village to become the Sahayak of an MPI who becomes responsible for initiation of milk collection, weight measurement, testing and record keeping for onward despatch to the nearest bulk milk pooling point. However, the MPIs thus formed shall be registered under the Assam Cooperative Societies Act to form Dairy Cooperative Societies (DCS).

(ii) Each of the 999 DCS to be setup, shall be provided with one solar powered Data Processor Milk Collection Units (DPMCUs) benefitting around 45,000 dairy farmers in total that will result in a daily average milk procurement quantity of around 200TKgPD. The project envisages covering 100% of the milk procurement through the DPMCU network and through Automatic Milk Collection Units (AMCUs) to be allocated in each of the BMC units with online billing system for direct transfer of milk bill payments to the bank accounts of the individual dairy farmers. The summary of targets under village based milk procurement systems is mentioned in the table below [Distt & blockwise breakup at *annex C1.3.1(a)]:*

Particulars	Unit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	EoP
MPIs/ DCS to be formed	Cum Nos.	122	249	271	202	123	32	0	**999**
DPMCUs to be allotted	Cum Nos.	122	249	271	202	123	32	0	**999**
AMCUs to be allotted	Cum Nos.	2	6	14	19	21	18	4	**84**
Avg. daily milk procurement	Cum TKgPD	25	36	54	82	120	159	202	**202**
Producer members in functional MPIs/ DCS added	Cum Nos.	1275	5180	10650	18480	27895	36400	44955	**44955**
Avg. per member proc. in functional DCS	Cum. KgPD	2.5	2.75	3	3.25	3.5	3.75	4	**4**
Avg. per MPI dairy farmers in functional DCS	Cum. Nos.	15	20	25	30	35	40	45	**45**

- The heart of the initiative is the effort to reduce transaction costs, achieve better scale & efficiency and, most importantly, ensure greater accountability.
- The milk procurement system will primarily revolve around a network of 84 BMCs of 2 (Kiloliter) KL, 3 KL and 5 KL capacities, installed at various strategic locations for a cluster of potential villages that will create a combined installed capacity of over 3, 07,000 litres per day. By the end of the project period, around 86% of the milk procurement volume is proposed to be handled by BMC units as below:

Build-up of chilling capacities under APART									
Particulars	**Unit**	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Yr 7**	**EoP**
2 KL BMC	TLPD	2	4	4	0	7	0	0	**17**
3 KL BMC	TLPD	0	2	6	9	8	6	0	**31**
5 KL BMC	TLPD	0	0	4	10	6	12	4	**36**
Total installed capacity of BMCs	**TLPD**	**4**	**14**	**46**	**77**	**68**	**78**	**20**	**307**

- To provide impetus to climate resilience and green energy, solar powered BMC units will be introduced on a pilot basis covering around 10% of proposed BMC units of different capacities

(e) **Processing and Marketing of liquid milk and milk products:** At present the liquid milk processing plant of WAMUL located at Guwahati is having an installed capacity of 60 TLPD and is running at a capacity utilisation of over 80%.

(i) In line with the objective of increased value addition to the milk producers, the processing capacities need a major fillip with special focus on higher value added products. Considering the projected volumes of milk to be handled by the cooperatives, under APART project area, it is proposed to expand the capacity of the existing dairy plant located in Guwahati from 60 TLPD to 150 TLPD and setting up of modern dairy plants at Jorhat and Silchar of capacity 60 TLPD and 30 TLPD respectively. However, due to limitations of funds under this project, the processing plant of 30 TLPD capacity proposed at Silchar can be funded from alternative sources.

(ii) The investment for milk processing infrastructure would be on a ratio of 75:25, where 75% funds will be sourced from the project while the remaining 25% funds shall be mobilised by WAMUL from other sources of finance.

(iii) The expansion of existing infrastructure at Purabi Dairy from 60 to 150 TLPD would include expansion of conventional liquid milk capacity to 150 TLPD along with a product making

block and an UHT plant of 50 TLPD capacity. Besides, the infrastructure would be provided with production facilities of high value added products like curd, paneer, cream and ice cream etc. However, the UHT facility initially proposed to be funded under the project, will now be funded through alternative financing sources due to limitation of funds under the project.

(iv) The new plants at Jorhat would also have facilities for value added products like curd, paneer and cream.

(v) The build up of additional processing capacities of WAMUL envisaged under APART are shown in the table below:

Particulars	Unit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr-7 (EOP
Expansion of LMP at Guwahati from 60 to 150 TLPD	TLPD- cum	60	100	100	100	150	150	150
Setting up of 60 TLPD processing plant at Jorhat	TLPD- cum	0	0	60	60	60	60	60
Total addition to installed capacity of plants	TLPD- cum	**60**	**100**	**100**	**160**	**210**	**210**	**210**

(vi) The plan envisages selling 217 Thousand Liters Per Day (TLPD) of liquid milk by the end of seventh year by expanding to several urban, semi urban and rural areas of Assam that will be catered by liquid milk processing plants in Guwahati and Jorhat.

(vii) The distribution model envisages setting up of walk in coolers at strategic towns (other than processing centres) from where the product shall be distributed. Necessary milk handling infrastructure (viz. visi-coolers, insulated boxes, crates, refrigerated vans etc) for distribution of packed liquid milk and milk products have also been proposed under the project.

(viii) To increase the share of formal sector/ cooperative, a strong and vibrant market thus setup, shall be complimented with a consumer education programme for promoting consumption of processed packaged milk and milk products.

(ix) As per the projections, WAMUL would be selling liquid milk in different variants and various milk products as mentioned in the table below.

Milk to be sold in sachets and through products by WAMUL under APART									
Sl. No.	Particulars	Unit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
A	Liquid Milk								
1	Smart Milk	TLPD-cum	47	57	79	95	111	131	152
2	Standard Milk	TLPD-cum	12	14	20	24	28	33	38
	Sub Total	TLPD-cum	59	71	99	119	139	164	190
B	Milk sold through products	TLPD-cum	7	9	13	16	19	23	27
	Total milk to be sold	TLPD-cum	66	80	112	135	158	187	217

(f) **Capacity Building:**

(i) The project envisages capacity building training programmes for milk producers, village level functionaries, BMC and plant operators, marketing supervisors and executives / managers engaged in various project activities. The capacity building training programmes proposed under the project are listed below:

Sl..	Name of capacity building training programme
1	Basic training for sahayaks/ Secretaries
2	Refresher training for sahayaks/ secretaries
3	Farmers' induction program
4	DCS Management Committee Training
5	Awareness program on clean milk production
6	Training for operating BMC and AMC units
7	Supervisor Orientation programme
8	Training for operators of dairy plants
9	Training on quality systems (Dairy Officers)
10	Training for marketing supervisors
11	MDP for executives
12	Training on Environmental and Social Safeguards

193. Eligibility and Selection Criteria

(a) Clusters in milk sector – the WAMUL approach

(i) Level 1 – Milk Procurement Cluster: Village based milk producers' institutions (MPIs)/ Dairy Cooperative Societies (DCS) are clusters of individual milk producers to facilitate collection/pooling of milk and act as conduit for delivery of input services. At the milk pooling point (Milk Procurement Cluster), primary milk collection activities viz. weight measurement and testing takes place in data processor based milk collection units (DPMCUs). The milk quantity and quality (fat and SNF) received at these milk pooling points with DPMCUs will form the basis for payment of milk procurement price to each of the individual dairy farmers.

(ii) Level 1 – AI Cluster: The MPI/ DCS also includes provisioning of doorstep AI delivery by mobile AI technicians (MAITs), cattle feed, feed supplements, fodder seeds, training , ration Balancing and capacity building etc. However, due to logistical and breakeven requirements, the AI centre may work over 2-3 MPIs and is considered as an AI Cluster (It may be noted that, during the project set-up stage, formation and functioning of an AI Cluster/ AI centre may precede formation of MPIs/DCS Cluster).

(iii) Level 2 – BMC Cluster: Milk is transferred from the milk pooling points to the nearest bulk milk cooling centre for chilling of raw milk for maintaining the quality of milk procured. The BMC units are equipped with automatic milk collection units (AMCUs) that enable cross checking the quantity and quality of milk received in bulk from Level 1. The BMC units proposed under APART will also act as mini warehouses for storing cattle feed, feed supplements, AI accessories etc. for further distribution.

(iv) Level 3 – The Processing Cluster: The milk processing plant is located near a major consumption centre / market. The chilled milk from BMC Clusters is aggregated at this plant for processing liquid milk (pasteurisation and standardisation) and manufacturing of milk products.

(v) The plant(s) is owned and managed by the multi district cooperative milk unions (WAMUL/ EAMUL/ CAMUL) and can be termed as the MilkProcessing Cluster. This level is essentially to get economy of scale for processing (pasteurisation and standardisation) and manufacturing of milk products.

(vi) Level 4 – Marketing Cluster: For distribution to towns away from the processing plant, a hub is proposed to be created with facility of cold stores to cover a cluster of nearby towns – This may be termed as the Marketing Cluster. The processing centre becomes the hub to cater to the major market and nearby smaller towns and can be seen from the perspective of a Marketing Cluster as well.

(b) **Principles/ assumptions followed for formation of clusters under APART:** The basic principles/ assumptions followed for formation of clusters under APART is mentioned below:

(i) For AI Clusters, a MAIT is appointed for villages with minimum 250 breedable population per village and a minimum of 2000 breedable bovines within a radius of approximately 6-7 KMs. Moreover, contiguity of such villages over a considerable area is an additional consideration so that these clusters can be linked to Milk Procurement Clusters.

(ii) At the present stage (planning level), only target number of MPIs/ DCSs are estimated for blocks proposed under APART. Secondary data from Assam ISS Reports have been used for identifying block and villages in APART districts based on the number of milch animals, per animal milk yield, milk production, production density and marketable surplus.

(iii) Around 40-60 KgPD of marketable surplus per village have been considered to arrive at the number of villages to be covered through MPIs. Moreover, the geographical proximity, a radius of 30-40 Km, of block was assessed to form clusters/ milk procurement routes of MPIs/DCS where BMCs can be installed.

(iv) In the existing districts of WAMUL, Kamrup, Barpeta, Morigaon and Nagaon, the existing milk procurement activities consist of 171 MPIs (that include 06 DCS) that have supplied a daily average quantity of around 21.78 TKgPD of milk during FY 2015-16. Hence, the past achievements of these four districts have also been considered for setting their milk procurement activities targets under APART. Creation of milk testing and weight measurement facility in the village level MPIs/DCS for direct payment of milk bills to their individual bank accounts.

(v) Block-wise procurement targets were used to decide the bulk milk cooling capacity to be created. Different capacities of bulk milk cooling units (2/ 3/ 5 KL units) have been proposed and their installation has been phased over the entire project period depending upon the estimated volume of milk to be procured.

(vi) Processing plants are based on the centrally located major market in the district level milk union, i.e. Guwahati (existing) and Jorhat. The capacities of these processing plants have been decided based on procurement/ marketing volumes projected for each of the Processing / Marketing Clusters.

(vii) Marketing hubs are based on the distance of the town(s) from the processing centre and the volume to be sold from such hubs to nearby towns. A distance of more than 100km from the process centre with potential of more than 5KLPD (in towns within 30-40 KM radius of such hub) would qualify for the hub.

194. Activities to be Financed

(a) Under the project, WAMUL would be implementing six major interventions viz. Productivity Enhancement, Village Based Milk Procurement Systems including chilling facilities, Milk Processing & related infrastructure including MIS infrastructure, Milk Marketing, Capacity building and Studies related to benchmarking of operational parameters and quality assurance related activities.

(b) The investment for Productivity Enhancement has been estimated at Rs. 10096 lakh that includes Doorstep AI delivery services,

(c) The investment on Village Based Milk Procurement Systems has been estimated at Rs.4400 lakh and will focus on formation of Dairy Cooperative Societies (DCS) / Milk Producer's Institutions (MPIs). These shall be provided with solar powered DPMCU, weight measurement and testing system. All such systems shall be networked for online recording of milk procurement. The system will support faster payment of milk bills (direct transfers to the individual dairy farmers' bank accounts). Moreover, Bulk Milk Coolers (BMCs) of different capacities will be installed at strategic locations where AMCUs will be installed. Besides, the milk procurement infrastructure created at villages will include allocation of milk cans and other collection equipment and accessories. It is also proposed to include few milking machines, for clean & hygienic handling of milk, to be set up at some of the DCS on pilot basis.

(d) The investment component on milk processing and related infrastructure includes major processing centres at Guwahati (expansion of existing plant) and Jorhat (setting of new plant). These centers will also be equipped with milko scans for ensuring receipt and processing of high quality milk for being sold to the consumers of Assam.

(e) The investment for component on milk marketing has been estimated at Rs.1027 lakh and it envisages building up of infrastructure in order to effectively sell estimated quantity of liquid milk and milk products in markets spread across urban, semi-urban and rural areas of Assam.

(f) The investment for component on Capacity Building has been estimated at Rs.1174 lakh. It proposes to cover capacity building through trainings, awareness programmes to all level of functionaries as well as producer members of the village level DCS/ MPIs.

(g) The project will also be investing Rs.80 lakh on carrying out important studies pertaining to benchmarking various operational parameters of WAMUL, Techno-commercial feasibility study & DPR preparation for processing infrastructure and HACCP analysis of milk procurement & processing activities

(h) The total proposed outlay of the Formal Milk Sector under APART is Rs.23762 lakh, a year-wise summary of which is shown in the following table.

Illustrative summary of investments (Rs in lakh)									
Sl.No.	**Plan Components**	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Yr 7**	**Total**
A	Productivity Enhancement	813.87	1220.75	1522.50	1537.52	1581.13	1652.32	1768.08	10096.17
A.1	Doorstep AI delivery	736.00	1086.00	1326.00	1296.00	1311.00	1354.00	1435.00	8544.00
A.2	Animal Fodder Development	4.20	8.75	9.45	7.00	4.20	1.05	0.00	34.65
A.3	Animal feed and feed supplements	73.67	126.00	187.05	234.52	265.93	297.27	333.08	1517.52
B	Village Based Milk Procurement System	390.86	685.81	924.28	980.75	665.19	550.27	203.08	4400.22
C	Milk Processing *	160.00	4835.00	1920.00	70.00	0.00	0.00	0.00	6985.00
D	Milk Marketing	193.36	165.48	170.75	103.37	129.53	133.40	131.30	1027.18
E	Manpower Development	150.28	255.41	298.37	240.60	158.93	59.36	10.65	1173.60
F	Studies Proposed	40.00	0.00	0.00	30.00	0.00	0.00	10.00	80.00
	Grand Total	**1748.37**	**7162.44**	**4835.89**	**2962.24**	**2534.78**	**2395.34**	**2123.11**	**23762.17**

*25% cost of expansion of Guwahati plant & setting up of Jorhat processing plant to be borne by WAMUL. 100% costs shown in the table.

195. Institutional and Implementation Arrangements

(a) The Managing Director, WAMUL will be supported by sectional in-charges of WAMUL's critical functional departments such as AI and input services, milk procurement, milk processing, milk marketing, finance and accounts and audit. A specific Operational Project Implementation Unit (O-PIU) shall be constituted within WAMUL for overseeing the roll out of activities under APART. The incremental operating team of officers and staff for implementation of the various activities shall be appointed under the O-PIU and funded under the project.

(b) The Milk Procurement team will be responsible for selecting potential village clusters, mobilising targeted producer members, identifying and selecting village level functionaries and rendering training to them, all milk procurement operations that includes formation of MPIs, communication activities in the villages and identification/ contracting with the building owners in the villages for specific sites where BMCs are to be installed.

(c) WAMUL initiated its programme for doorstep AI delivery services on a pilot basis under the previous World Bank funded AACP-AF project during FY 2014-15. The services revolved around a network of locally recruited mobile AI technicians and veterinary professionals sourcing high quality semen from "A" graded semen banks. Besides, for availing technical and managerial expertise to implement the programme, WAMUL had collaboration with NDDB Dairy Services (NDS) seeing its proven track record in implementing doorstep AI services under another World Bank funded project- National Dairy Support Project (NDSP). As the pilot programme under AACP-AF was successful, WAMUL intends to continue to draw the support of NDS.

196. Environmental and Social Safeguards: WAMUL would identify, select and deploy suitable personnel in its O-PIU for ensuring compliance towards the Environmental and Social Management Framework developed and publically disclosed by the PCU (ARIAS). This will enable WAMUL to mitigate

risks and vulnerabilities arising out of activities that have significant impact on the social and environmental fronts of the project

197. Grievance Redressal and Citizen Feedback Mechanism: Under the project, WAMUL would identify, select and deploy suitable personnel for designing formats/ templates for capturing grievances arising out of project activities as well as in escalating/ flagging those grievances to the concerned functional group of WAMUL. Arrangements will be made to keep record of grievances addressed and resolved within specific timeframe which can then be shared with PCU (ARIAS) for onward integration with their project ERP/ database.

198. Gender and Nutrition: At present WAMUL has covered around 30% women of the total milk producers as its pourer members of MPIs/DCS. Under the project too, WAMUL intends to further increase the coverage to around 50% women pourer members of the total estimated milk producers. Besides gender inclusion, WAMUL will look forward for nutritional security of rural dwellers by arranging to sale a part of its packed liquid milk and products to rural retailers.

199. Management Information System (MIS) under APART: WAMUL at present is having its own mechanism of recording, maintaining and retrieving information/ data that is being fed into a web based Dairy Information System which is a customised MIS developed and maintained by NDDB.

200. Project Purchase: WAMUL shall be following the purchase methods, procedures and rules laid down in the Project Procurement and Strategic Document (PPSD) of APART developed by PCU (ARIAS).

201. Sustainability: The financial assistance proposed to be sought by WAMUL under the new World Bank aided project will enable the milk union to create village level milk collection, testing and chilling infrastructure for transparent and regular payment to the dairy farmers. Moreover, the various processing and distribution facilities will enable the Union for selling value added milk and milk products to the consumers in the State.

202. Results Chain and Results Framework

(a) **Results Chain**

Activities	Sub activities	Output	Outcome
Establishing a network of MAITs for providing Quality AI services .	Training and induction of MAITs	1.AI to be administered -1132530 2.Birth of genetically improved 317110 calves (As per GoA's breeding policy for ensuring resilience) 3. Improve productive life and productivity of animals	1.Higher milk productivity with improved milk quality will lead to higher milk price realization by dairy farmers. 2. Reduce dependency on external feed resources by increasing usage of local feed resources 3. Reduction in global warming by reduced emissions of GHG like methane.
	Veterinary doctors and field staff deployment for implementation and monitoring of AI activities		
	Ensure use of INAPH software for updates and monitoring		
	Extension and promotion activities to popularize adoption of AI		
	Ensure vaccination and attending to animal health related aspects in close coordination with AHVD Department		
Delivery of Ration Balancing programme (RBP) Advisory Services through MAITs using INAPH network	Promotion for adoption of bypass protein feed and mineral mixture	1.Optimal intake of locally available feed resources - reduced feed cost by 20%. 2.Increase in per animal milk yield with improved quality . 3. Improved reproduction efficiency by reduction in inter-calving period thereby increasing productive life of milch animals. 4.Reduced emissions of green house gas like methane.	
	Adoption of fodder management practices through Silage making demonstrations		
	Improve availability of Fodder through fodder development programmes in association with Agriculture department / ATMAs		
	Improve availability of Cattle Feed by setting up Feed Plant(s) and mineral mixture plants		
Formation of milk producers' institutions (MPIs)/ dairy cooperative societies (DCS)	Formation of milk producers' institutions (MPIs)/ dairy cooperative societies (DCS)	1. Institutional arrangement to provide access to regular/ steady market for their produce (milk) through 999 DCS centres. 2. Channelizing/ organizing animal husbandry and input services like AI, feed and fodder distribution.	1.Increased income and profitability for the farmers through dairying - which is more resilient to climatic factors (as compared to agriculture). 2. Increased price resilience. 3. Greater participation of women and small farmers both as members

Activities	Sub activities	Output	Outcome
		3. Creation of alternative marketing channels leads to empowerment of dairy farmers in having higher bargaining power for their produce.	and in the governance of Village institutions. 4.Would result in alleviating poverty and reduction of unemployment. 5. Positive social impact by providing equal opportunities to all dairy farmers irrespective of Caste or religion as members of MPIs/ DCS.
Village based Milk Procurement System	Installation of solar powered data processor based milk collection units (DPMCUs) at the cluster of MPIs/ DCS and linking for online data transfer	1. Scientific and transparent pricing and instant acknowledgement of milk payment receivable by the dairy farmers 2. Electronic data available online for direct credit of milk bill into the bank accounts of individual dairy farmers	1. Farmers shall be more sensitive to quality parameters and therefore shall lead to quality conscious farmers 2. Direct benefit transfer to increase trust of farmers in the organised system. 3. Reduce the influence of unscrupulous traders, thus more dairy farmers to join the formal sector 4. Installation of solar powered systems will promote use of renewable / green source of energy.
	Installation of bulk milk cooling units (BMC) for cooling milk collected from MPIs/ DCS.	1. Cooling of milk within 3-4 hours of milking through additional BMC capacity of 318 KL. 2. Increase geographical spread/ reach to include more potential milk clusters 3. Improved quality of milk delivered at the Dairy plant. 4. Reduce transportation in cans and thereby bring down transportation cost.	1.Increased coverage of dairy farmers under organised sector 2. Improved quality of raw milk received at dairy resulting in superior quality of milk and milk products.
	Induct SS Milk tankers for milk transportation		
	Promote Clean Milk Production practices including use of milking machines (demos), distribution of SS cans etc.		
Establish complete processing and marketing linkage	Expansion of existing liquid milk processing plant of WAMUL with product making block at Guwahati as well as setting up of a new modern dairy plant by WAMUL at Jorhat .	1. Enhancement of the milk processing capacity from 60 TLPD to 210 TLPD . 2. Value added products and packaging to fetch higher returns on farmers produce. 3. Adherence to food safety norms	1. With sufficient processing capacity dairy farmers can be assured round the year remunerative market for their produce. 2. Ensure availability of safe and hygienically packed milk & milk products to larger number of consumers - thus adding to nutritional and food security requirements of the society.
	Establishment of marketing hubs for sales and distribution of milk and milk products	1. Increase geographical spread and size of market to reduce risk from market uncertainties by setting up markets in 13 new towns. 2. Provide access to safe and hygienic processed milk to a larger populace	1. Ensure round the year stable market for milk to the producer members 2. Increased market share of organised sector 3. Improved per capita milk consumption
	Create awareness for safe and hygienic, processed milk consumption	1. Reduction in health hazards 2. Increase in sale of packed processed milk and to market additional 217 TLPD.	

(b) Results Framework

Major activities	Unit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
AI services to be administered per year	Nos.	56550	156420	303330	482790	679374	894546	1132530
Calves to be born per year	Nos.	15834	43798	84934	135181	190225	250471	317110
Villages to be covered under AI	Nos. (cum)	1404	2472	3360	3360	3360	3360	3360
Dairy farmers to be covered through MPIs/DCS	Nos.(cum)	1275	5180	10650	18480	27895	36400	44955
Quantity of milk to be procured from MPIs/DCS	TKgPD (cum)	25	36	54	82	120	159	202
Creation of chilling capacity (BMCs)	TLPD (cum)	4	18	64	141	209	287	307
Creation of liquid milk processing capacity	TLPD (cum)	0	40	130	130	180	180	180
Milk Sales	TLPD (cum)	66	80	112	135	158	187	217

203. Risk and Mitigation Measures: The possible risks and their mitigation measures are as below-

Sr	Risks	Risk Mitigating Measures
1	Delay in deployment of Trained AI technicians (MAITs) as proposed due to: · Delay in procurement of Goods · Delay in release of funds	Necessary steps will be undertaken by WAMUL ensuring timely deployment of Trained AI technicians.
2	Trained AI Technicians may not be able to achieve targets because of -	· Enactment and effective enforcement of the Bovine breeding Bill & its implementation for registration of AI technicians and oversight for adherence to SOP.
	· Unskilled and non-supervised AI technicians charging very low rates for delivery of AI services in the same area.	· Extensive promotion activities will be undertaken.
	· Animals may get conceived through natural service due to open grazing practices which is quite prevalent in the state.	· Animal Husbandry Department will spearhead a campaign to castrate all the scrub bulls in the project area with proper legislation and /or through persuasion using extension
	· Poor acceptability /awareness of AI in the region.	
3	Resistance towards ear tagging by farmers in the initial years of the project	· Extension & awareness Programmes among dairy farmers Wide publicity about the services and charges through various promotion materials.
4	AI technicians being unable to capture and submit data on AIs done and pregnancy diagnosis done as per the requirements of INAPH	· A I technicians will be equipped with tablet with 24X7 connectivity · Strict action on erring AI technicians
5	Higher attriton rate of Veterinarians	Capacity Building, Motivations and incentives to retain Vets.
6	Resistance to MPI formation	Motivating and convincing the Milk producers on the benefits of forming MPIs
7	Reduction in active milk pourers	Although fluctuation in the nos. of active pourers will remain but as we intend to procure the marketable Milk surplus, procurement of Milk should not be a problem after successful implementation of productivity enhancement services.
8	Spoilage of Milk in transit	BMCs will be located at all strategic locations so that collected milk reaches the BMCs within optimum time
9	Fluctuations in the supply of milk at processing plant	Sufficient storage capacity will be built in so that additional milk quantity can be stored
10	Milk and Milk products not upto the quality standards	Introduction of quality systems and obtaining quality marks will reduce chances of quality deviations. Grievance redressal mechanism will address occasional deviations in quality, if any.
11	Competition at the market posed by new entrants	Wide local procurement mechanism will enable to procure milk at lower cost. Moreover, targeted market penetration of 35% will be achieved despite competition.

Sub-Component C1.3.2: Milk Value Chain: Informal sector

204. Overview of the Sub-component: The dairy sub-sector in Assam makes important contribution to livelihoods, nutrition and the economy. Growing demand for animal source foods will drive expansion of this sub-sector, and strategic inputs are required to maximize the benefits and mitigate the risks of a rapidly growing livestock sector.

205. Background: Dairy in the State is characterized by rural smallholder and subsistence production system along with specialized dairy production belts (with improved cattle) in urban and peri-urban areas. Dairy development in Assam has not kept pace with national trends or realized local potential. Increasing farm level production and productivity requires more improved animals, improved fodder/feed technologies and livestock services, however, smallholders access to reliable markets to absorb more milk at remunerative prices is an essential driver. Organized marketing (formal) of milk in Assam remains relatively insignificant despite efforts in the past to develop and promote collective marketing mechanisms. The traditional market (informal) with either fresh liquid milk or milk products accounts for about 97% of the market opportunities for farmers. It is thus apparent that development of the traditional market will be extremely important for the Assam dairy sub-sector as it transits to a more formal way of operating, and therefore it is necessary to inject interventions that could facilitate improvement of the market (Comprehensive Dairy Sector study, 2007).

206. A major area of concern in the traditional market is the quality and safety of milk and milk products supplied. Work by ILRI with partners in developing countries, including a pilot initiative in Assam, demonstrated that small-scale informal market actors are willing and able to apply more hygienic practices and participate in quality monitoring scheme, when provided with incentives: such as, certification, licensing, or improved business skills (Johnson et al., 2016). Improvement in quality in the traditional market will raise the demand and value of the products and thus income and employment. It will also help facilitate the evolution of the traditional market towards the more regulated and organized market.

207. If this whole informal /traditional sector is routed through adoption and improved package of practices in production, handling, trading, processing and marketing it can bring significant change in entire milk market sector with substantial contribution to the economy and ultimately this neglected sector can be brought under the ambit of the formal sector. The above issues of concern need to be addressed with effective mechanism and the informal milk sector will be formalized in phased manner.

208. Sub-Component Objective: : Transformation of the informal dairy sector into the formal one through improvement in resilience in production, quality, safety and standards of milk adding value to the produce with particular focus on informal market actors and dairy-entrepreneurs in targeted districts.

209. Policy & Regulatory Environment

(a) **Legal Provision on food safety & Standards**

(i) Food Safety Standards Act, 2006: An act to consolidate the laws relating to food and to establish the Food Safety and Standards Authority of India for laying down science baed standards for articles of food and to regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food and for farmers connected therewith or incidental thereto. Dairy officials need to be delegated with powers of food safety officers as they are all qualified as per the prescribed norms. The dairy officials so empowered can assist the officials under the State Commissioner,

Food Safety and Standards Authority of India (FSSAI) in respect of milk and milk products and to facilitate enabling conditions of milk market regulations of the state (Sec 36, Sec 37 of FSSA, 2006 & Sec 2,1,1 Sec 2.1.13 of FSS Rules, 2011). The Food Safety Officer will ensure the food safety and standards prevailing in the existing unregulated milk market constituting 95% in the unorganized sector.

(ii) Food Safety and Standards Rule, 2011

(b) **Legal Provision on Cooperatives:** Assam Cooperative Societies Act, 2007

210. Eligibility & Selection Criteria: for selection of informal dairy clusters (milk market actors)

(a) Each block will be considered as a cluster.

(b) Areas with presence of vendors, sweet makers, cottage processors and milk producers located in and around the urban and peri-urban areas where informal milk market actors operate will be considered. The urban and peri urban areas of a block will be the target zone of operation within a radius of around 10-12 Kms.

(c) Volume of milk and milk products handled by the market actors in a cluster should be around 5000-6000 LPD.

211. Activities to be financed including Illustrative List of Investments

(a) **Market**

(i) **Market assessment through mapping of market actors of informal dairy value chain: To be outsourced to ILRI (Cross cutting with Pig Component):** Under this activity, ILRI proposes to survey and map the informal dairy clusters. ILRI will record actor types and numbers, volumes traded, agricultural and veterinary infrastructure, farmer organizations (DCS, SHG, MPI), markets, roads and other relevant information in each project district before starting to implement the activities. The mapping will be conducted through key informant interviews and participatory discussions with the market actors during which GIS data will be collected using a hand held GPS. This will be imported to a GIS platform to produce. The primary information gathered will be validated and supported by secondary information and the resulting report will set out the situation in clusters, districts and the state. The information will help plan resources required in each district, build understanding of specific project needs, and guide the long-term strategy of informal sector convergence with the formal sector. In this exercise, officials of DDD will be involved and their capacity will be strengthened to do this type of reconnaissance before planning fieldwork. The mapping will also help the local officers to gather specific information about their cluster and create linkages with relevant actors. Finally, maps of respective clusters with information can be used for planning not only for this project but for other projects as well.

Assumption	**Total Number of Milk Market Actors to be covered under Informal sector**			
Total numbers of Milk Market Actors to be covered per district				1000
Milk Producer	Milk Traders	Sweet Makers	Cottage Processors	
600	200	100	100	1000
Total numbers of Milk Market Actors for 16 districts				
9600	3200	1600	1600	16000
Area of Operation				
Based on previous experience of working on informal dairy sector in Kamrup(Metro) and Jorhat ,it is assumed that at least 1000 milk market actors comprising of 600 producers, 200 traders, 100 sweet makers & 100 cottage processors would be targeted to be trained in each district. The urban and peri urban areas of a district will be the target zone of operation within a radius of around 10-12 Kms.				

(ii) **Assessment of human health risk in dairy value chain with particular focus on informal sector before and after interventions: To be outsourced to ILRI:** Under this activity, to build the

confidence of government officers and adequately skill them to undertake risk analysis (risk assessment, risk communication and risk management)for food safety as required by FSSA, 2006,ILRI proposes to mentor the DDD officers in executing this on-job. The dairy officers and technicians trained on lab technologies will mainly be involved in this. Graduate and master students from CVS will also be encouraged to take part in this systematic approach of risk assessment and communication in the food value chain.

This is best done as a “farm to table” approach so that critical control points can be identified where food must be checked and control action can be taken. Moreover, the initial assessment will provide an intensive opportunity to build skills, knowledge and commitment in all concerned government officers. Under this, it is proposed to assess the major health risk in terms of adulterants, microbial load, antimicrobial residues and aflatoxins. The findings would be an important baseline for the state to design any action for improving milk quality and safety. The information would also support in the content development for consumers’ awareness campaign and serve as a baseline indicator for project outcome assessment.

The information from the risk assessment will be directly used to identify which adulterants/hazards need to be tested for, at which points, and how often. This information in turn will be used to source affordable and practicable tests. After completion of the risk assessment, risk communication is important to undertake under the systematic approach of risk pathway as explained under FSSA-2006.

For risk communication ILRI propose to have interactive exchange of information and opinions among risk assessors, risk managers, value chain actors, consumers, dairy processors, the academic community and other interested parties. This discussion will cover the risk assessment findings and be the basis of risk management decisions. Based on the discussion, together with DDD, ILRI will develop extension and knowledge products to generate awareness among relevant stakeholders and to help guide the market actors in following the practices that can best manage risk. For example, if antimicrobial residues are high in milk, there is need of generating awareness among the producers about the health hazard caused by it and risk reduction approach that they can follow to reduce it. This could include judicious use of antimicrobials, consultation with veterinarians before use, follow of milk withdrawal periods after use of antimicrobial and so on. On the other hand, if antimicrobial residues were not a problem, but aflatoxins were, then the capacity building would focus on aflatoxins. This approach will help to make interventions evidence-based, risk oriented and target group specific.

ILRI proposed to conduct the risk assessment study before and after the Training, Monitoring and Certification (TMC) interventions in order to assess the impact of the interventions in term of improved milk quality and safety. This would increase the capacity of the DDD, and help the DDD officials to follow risk management approach more extensively and with more confidence even after the exit of the project.

There is a common apprehension that informal dairy sector poses a risk to human health but the concerned authorities do not have documentary evidence to state what these risks are, what are their magnitude, what causes the risk, what are the critical control points and so on. Evidences gathered from ILRI's initial pilot study in and around Guwahati city reported that about 86% milk samples traded in Guwahati city contain antibiotic residue and 4% samples contain aflatoxin. Microbial load of the milk samples were above the acceptable level and prevalence of zoonotic pathogens like Brucella and Mycobacterium were high. Unfortunately, the concerned departments have not conducted any study throughout the state to understand the magnitude of risk posed by milk and milk products to human health and their possible control options. Therefore, it is proposed to conduct a risk assessment study

throughout the informal dairy value chain (may include formal sector as well) to identify the risk and their critical control points and to design customized intervention to reduce the risk. This would help to make interventions more evidence based, risk oriented and target group specific which would ultimately help in judicious use of available financial and manpower resources. The study findings would also serve as baseline indicators of milk quality and safety that could be referred during impact evaluation study at the end of the project. Because of the strength of ILRI in doing this type of activities, it is proposed to conduct the study in partnership with ILRI.

To assess the outcome of all the informal dairy sector initiatives in terms of improved resilience, milk quality, safety, standards and economic outcome, it is proposed to repeat the initial baseline laboratory testing of milk samples for risk assessment at the end of the project. To understand the actual benefit derived from the project, it is proposed to repeat the study to assess the difference before and after the project and also with the beneficiaries who have availed the benefit and who have not (control group).The evaluation will be linked to achievement of project development objectives

(iii) **Establishing of Peer Monitoring & Certification Process for Food Safety in Place:** To follow FSSA, 2006 norms it is important to test milk/ milk product samples traded by informal market actors periodically for checking quality and safety. In order to do so it is a critical requirement for improving the lab infrastructure of the head quarter (established during AACP) and district dairy plants/offices under DDD. In addition to improve lab infrastructure, fund would be required to buy laboratory consumables, to collect milk/milk product samples from the field from time to time, to recruit one laboratory technician on contractual basis (initially for 3 years under the project, thereafter, the department has to engage permanent employees for sustenance of the plan) and to train them for carrying out day to day lab work. Regular milk sample collection and quality checking of milk market actors will be done and the market actors adopting the improved practices will be facilitated for registration/licensing under FSSA, 2006/ Municipality.

(iv) **Developing Protocol and Quality Assurance System (to adhere with FSSA, 2006,** to be outsourced to ILRI: Milk testing can be laborious and expensive and DDD will need guidance on what tests are appropriate. Laboratory testing requires improvements to the laboratory infrastructure of the DDD headquarter and district offices. An ILRI team, in association with FSSA and DDD officials, will visit the existing DDD laboratories to assess the capabilities to do the required milk tests. They would also identify critical gaps in lab infrastructure and resources and provide technical guidance to address the gaps and to identify the range of tests to be carried out. Regular testing, in turn needs a laboratory quality assurance program, which includes external testing by third party laboratories. ILRI will work with DDD to design and develop standard protocol for laboratory work; and, how to put in place a food quality and safety assurance process. The protocols would include procedures from sample collection in the field to packaging, storing, dispatching, long-term storage and analysis. It would also advice on discarding biological samples and sending for advanced testing taking appropriate measures for safety. The quality assurance programme will be monitored by ILRI from time to time to ensure a sound lab technology system in place.

(v) **Policy Action to Implement FSSA 2006 and other prevailing laws and practices:** To implement the programme successfully, it is important to take some policy decisions by the policy makers at the beginning of the project. These include: a) to notify dairy officials as Food safety Officers having pre-requisite qualification as per the provision of FSSA, 2006 and b) to notify the existing Joint Coordination and Monitoring Committee (JCMC) of all relevant government departments and ILRI as State Advisory Body provided under FSSA, 2006 c) to constitute JCMC in each project districts (at district level), d) to get the existing lab under DDD accredited as per the provision of FSSA, 2006. To make policy

decision, there is not much involvement of cost but strong policy facilitation will be required needing organization of policy discussion workshop and policy meeting.

(vi) **Linkages and Support to Market Actors to run their business efficiently following prevailing laws and practices**: It is observed that many of the informal milk market actors are running their business without a valid trade license issued by municipality/town committees and/or registration/license under FSSA, 2006 etc. It is proposed to bring all the informal market actors under the act of food laws & regulations prevailing in the state. Towards this, it is intended to make training to adopt improved practices and certification as a pre-requisite for availing FSSA registration/license and trade license from municipality/town committees. Training and certification could also be a requisite to avail credit/loan for any actors involved in the chain. This would ensure that all market actors would have basic knowledge and skill to trade quality and safe milk and milk products to the consumers. To differentiate the trained and certified market actors from untrained one by consumers, it is proposed to give them a physical recognition in the form of uniform/ apron/ badge/logo/ cap/identity card or some other things based on discussion with the target groups. Soap, muslin cloth, milk measuring liter, bleaching powder, Saaf-kit, SS milk pail etc will be provided for 30 member per group of trained market actors. This would help the market actors to position their products as quality one and to expect good return for quality. In addition, it is proposed to support them by creating linkages with bank and financial institutions so that they could create necessary infrastructure and facilities to fulfill the requirement under FSSA, 2006. Besides, it is also proposed to organize animal and human health check up camps in each project district (with the support of AHVD & Health Deptt) to treat and generate awareness about preventive health care among animals and market actors towards reducing the risk of transmission of zoonotic (that transmit from animal to humans and vice versa eg. brucellosis, tuberculosis, Q-fever, leptospirosis etc.) and food borne diseases. For better social security, it is also proposed to link them with insurance (human and animal) companies as well

(vii) **Formation of Licensed Market for Better Positioning and Increasing Traceability:** The major challenge in the unorganized sector is that it is always difficult to get access of the milk market actors and to communicate with them because of their dispersed nature. Therefore the Hygienic Milk Monitoring Committees (HMMC) proposed to be constituted immediately after each training to adopt improved practices in each area would be transformed into a formal/licensed Market Actor Groups for better traceability and access. These groups can look after the common activities of all the members of market actors in addition to monitoring of adoption of improved practices. If the traders, sweet makers and cottage processors have existing traders and sweet makers associations, those would be strengthened under the project. The format of these licensed groups will be designed as per the local need and nature of business run by the groups. These groups will play role in increasing access to inputs, services and market. All such group/organization will be supported with capacity strengthening and need based support for setting up a small office and to acquire milk testing kits, value addition inputs, deep fridge etc. Such support will be provided subject to receipt of sustainable business model. They will be trained on organizational management, book keeping, conflict resolution etc.

(viii) **Designing Strategy for Food Safety Communication and Awareness Building of Consumers**: (to be outsourced to ILRI, cross-cutting with pig component)- Building consumer knowledge and awareness can drive quality down the supply chain encouraging good practices/products and discouraging bad. This will entail sensitization on the nutritional benefits of milk &milk products, health risk from consuming poor quality products, and, identification and sourcing quality products. This would also help increase demand for products and underpin a demand-driven dairy sector. ILRI will quickly investigate consumer preference and behavior related to milk and milk products in order to design a communication strategy. Based on the evidence, ILRI's communication expert will provide technical

guidance to DDD. Also ILRI will guide the department in generating concepts and content for communication products. However, actual the implementation of communication strategy should be by a private firm based on the strategy and content developed by DDD.

(ix) **Consumer Awareness and Campaign particularly on Food Safety and Zoonosis**: Consumer's awareness building is critically important to create a demand driven production and marketing system of quality milk. Toward this, the project would launch a mega generic campaign through print and electronic media and through community level activities like road shows, street play, exposure trip, art competition/debate competition among school children etc. to generate awareness among the consumers about the characteristics of good and poor quality milk and the risk of consuming poor quality milk for human health. Such extensive generic campaign will be initiated in each district during the fourth and sixth years of the project.

(b) **Processing**

(i) Encouragement for supplying milk to formal milk processing sector subject to receipt of good price for milk

(ii) Convergence of DCS and formal processors

(c) **Aggregation: Developing Collection Centres at each DCS for milk collection:** For better aggregation of milk produced by each members of the dairy cooperative society (DCS), a common collection centre plays a crucial role. This common collection point (suitable premises to be contributed by the DCSs) will have the facility of milk quality testing like milk analyzer with all accessories to test all the physical parameters/contents of milk of each farmer and to records them daily for making milk payments to farmer members by the DCSs. For facilitating the milk aggregation, 3(three) nos of 40 liters milk cans will be provided to each DCSs and SS milk pail will be provided to each of the members of DCS for clean milk collection

(d) **Production**

(i) **Formation of DCS among the interested trained producers under the informal dairy value chain:** The trained milk producers who want to have a legal status of milk producers cooperatives will be registered as Dairy Cooperative Societies (DCS).They will be registered under the state Cooperative Act, 2007 and will be supported with capacity up gradation, input services, market access and other linkages in milk value chain. For organization of motivation and awareness amongst the farmers to form DCS, supports of NGOs will be taken for registration of DCSs and their handholding. Total 160 DCSs will be formed in 16 districts, assuming that 600 milk producers per district will be trained for customized improved practices and may opt to have a legal status of milk producer cooperatives*. If 30 nos of milk producers are considered to form Dairy Cooperative Societies (DCS), there will be 20 DCSs in each district. But it is assumed that only 50% of the milk producers will opt for upgrading them as DCS. So there will be 10 DCS per district totaling the number to 160 DCS in 16 project districts.*

(ii) **Assessment of critical need gap of old DCS and making arrangement for need based support:** Under the earlier World Bank funded project AACP, the Dairy Development Department had formed 312 nos of Dairy Cooperative Societies (DCS) in 9 districts of Assam which are common districts out of the 16 project districts targeted under APART. However the project support to these DCSs was withdrawn with the closure of AACP. These 312 nos. of old DCSs will be assessed on various parameters to determine which DCSs can be taken up by formal dairy activity under WAMUL. This assessment will be jointly carried out by both DDD and WAMUL. Under APART, the 50 numbers of oldDCSs operating in the peri urban areas out of these old DCS are proposed to be assessed afresh. Assessing the performance of the old DCSs will be done on different parameters of cooperative society norms and milk volume handled and will be categorized **as "Highly Performing", "Performing"** and "**Non-**

Performing". After that interventions/supports will be identified and work plan will be prepared through participatory consultation based on the categorized group. Need based intervention/support in the form of capacity strengthening, value addition and other inputs, forward linkages, technical backstopping etc will be provided under the project. After that evaluation of the outcome of interventions at yearly interval and support for future scaling up will be done.

(iii) **Mastitis and Reproductive Health Management (to be outsourced to ILRI):** Mastitis is one of the most economically important diseases of dairy animals in Assam and elsewhere in India. Studies suggest that there is high prevalence of both clinical and sub-clinical mastitis in the state, which cause huge economic losses to the dairy animals. Milk from mastitis-affected animals contains a heavy microbial load, which not only causes milk spoilage but can also cause human illness. Therefore, it is proposed to demonstrate a mastitis management programme in a small cluster (around 100 farmers) under the project to reduce the prevalence. Under this, all dairy animals in the project households will be tested with California Mastitis Test (CMT). Based on the test results, farmers and local veterinary officers will be guided to take corrective action in the form of antimicrobial treatment and preventive measures including cleaning and hygiene practices. If required, the samples would also be sent to the microbiological laboratory of College of Veterinary Science (CVS), Khanapara and the North East Disease Diagnostic Laboratory (NERDDL), Guwahati for antibiotic sensitivity test. This would help identify the right treatment for animals, reduce cost and losses and also helps in reducing antimicrobial residue resulting from incorrect use of antimicrobials in mastitis affected animals. Towards this, some extension and information materials will be developed that AHVD could use wherever necessary. In addition to mastitis, another major economically important problem of dairy animals is reproductive disease. Many dairy animals suffer from brucellosis, abortion, repeat breeding, infertility, metritis, endo-metritis etc. Economic losses caused by the reproductive problems are enormous. Besides, they are a risk to human health and loss of time to farmers. Therefore, it is proposed to demonstrate a reproductive health management programme alongside mastitis management. The demonstration site would be a learning hub for AHVD officials and these will be supported in replicating the learning experience to larger areas. It would also demonstrate the benefits that can be achieved by disease control, motivating scale-out. Field exposure for ToTs could also be organised in the demonstration cluster where they could learn and take the learning to their respective places. The extension materials developed for the hub could be reproduced to use in all other project districts. This demonstration will also help AHVD to design their extensive reproductive health management plan and to prevent wastage of scarce resources earmarked for this. Finally, this demonstration would not only reduce the incidence of common diseases of production, but also improve productivity and economic efficient. After the capacity of government officers has been built to diagnose and manage mastitis and reproductive diseases in the 100-household cluster, it will be necessary to roll out the programme in the field. To do this, reproductive health management camps will be organized in the project villages. The camps will be organized with support from local veterinary officers, expert from the veterinary department and teachers from CoVS. Graduate students from the college will also participate in these camps and learn from it. Under this initiative, all the dairy animals in the project households will be systematically screened for reproductive diseases using a protocol based on analysis of herd health, history and rapid tests (e.g. Milk Ring Test for brucellosis). A health card will be provided to each farming household against each animal where all the findings will be stated for further reference. All information will again be put in computer/tablet for further reference by AHVD. This will also generate a database of all the dairy animals in the cluster and their farming families for AHVD. Based on prevalence finding, local veterinary officers/other concerned veterinary officers will be suggested/guided to take appropriate corrective measures.

(iv) **Technical assistance for introducing new feed technologies: To be outsourced to ILRI (Cross cutting with Pig Component-**ILRI proposes to provide technical support to entrepreneurs in running small feed mixing units and would organize training and technical support for feed entrepreneurs. This would include facilitating interaction between entrepreneurs and equipment suppliers, ingredient suppliers, maize growers and market agents through organising interactive sessions. It would guide AHVD in sourcing improved varieties of seeds with higher feed values (e.g. Quality Protein Maize) and promoting food-feed crops such as maize, sweet potato, tapioca, calocasia (taro). ILRI would establish a cross-learning system between WAMUL, Agri Department, ATMA, AAU and AHVD officials on interventions related to feed and fodder and support linkage with WAMUL for feeding and storage practices including ration balancing and fodder processing (e.g. silage making.

(v) **Assessment of animal waste reuse for mixed crop-livestock system: To be outsourced to ILRI (Cross cutting with Pig Component)-** Future intensification of livestock in Assam is likely to lead to increased farm waste generation. In order to mitigate the environmental and health impacts of livestock waste, reuse and recycling of waste need to be considered. ILRI proposes to facilitate discussion between farmers' groups and tea growers, vegetable growers, banana growers for better use of farm waste. Also ILRI will provide technical guidance on use farm waste in backyard garden for food-feed crop cultivation and vermicomposting for health and economic benefits.

(vi) **Technical advisory services to DDD & AHVD for project planning and implementation: To be outsourced to ILRI (Cross cutting with Pig Component-** Successful implementation of the project requires judicious planning and implementation. ILRI proposes to provide advisory services to AHVD & DDD on different aspects of project planning, implementation and management as and when requirement arises. This service would be applicable to other components where ILRI is not going to be directly involved. This technical support will be coordinated by ILRI-Guwahati with occasional support from ILRI-Nairobi. Initially, substantive support (4days a month) will be offered to both the departments, which will be reduced, by the end of the project to allow the department to work without any external support from ILRI.

(vii) **Facilitate coordination and collective action among project partners and beyond: To be outsourced to ILRI (Cross cutting with Pig Component)-** ILRI, being an international agency with presence in Assam and in India for several years and an extensive working relationship with government and non-governmental organizations, institutions and private firms in the state and beyond, is best placed to facilitate coordination and collective actions among government and non-government organizations and institutions to realize the benefit of multi-sectoral/multi-institutional activities. ILRI has already successfully demonstrated such an initiative in Assam, where it brought AHVD, DDD, Guwahati Municipal Corporation (GMC) and Health Department under a common platform to constitute the Joint Coordination and Monitoring Committee (JCMC) under the chairmanship of Director, Dairy Development, Assam in order to co-ordinate towards improving milk quality and safety. But JCMC will be notified by GoA at both state level and district level under APART as per provision of FSSA, 2006 to assure sustainability. Similarly in Nagaland, it brought Vet. Dept., Govt. of Nagaland, Ministry of Agriculture, Govt. of India, Nagaland University (NU), AAU, NRCP, National Bureau of Animal Genetics Resources (NBGAR) together to draft a pig breeding policy for the state. Using the same approach ILRI proposes to help in facilitating consultation among AHVD, DDD, Agriculture Department, Horticulture Departments, AAU, WAMUL and ICAR-NRCP in regards to interventions on feed, fodder, crop residue and livestock waste management/reuse. It would also support integration with other project value chains (e.g. maize) and activities such as business planning support for milk and pork value chain actors. ILRI would basically 'point' these actors to other activities within APART and would play a coordination role. It can also facilitate interaction and collective action between AHVD, ALDA & DDD, in regards to actions on informal

dairy producers. On food safety, it can facilitate interaction among AHVD, DDD, FSSAI, Health Department, Municipalities, AAU and NRCP to discuss and facilitate collective actions. On zoonotic diseases (e.g. brucellosis, tuberculosis) ILRI will coordinate with Health Department to focus testing for zoonotic diseases in the targeted field sites. This will be done at no cost to the project and is a benefit of working with ILRI which has existing contacts and a mandate for collaborating with Health Department and Public Health Foundation of India (PHFI) under ILRI's broader national mandate on zoonotic diseases. Its' strength further can be rightly utilize to create linkages with other CG centres, ICAR institutes and international organizations. ILRI has excellent working relationship with all these organizations.

(viii) **Animal Health Cover- To be implemented by AHVD(Cross cutting with AHVD)**

(e) **Capacity Building:**

(i) Capacity building of dairy farmers & Vety field officials –to be implemented by AHVD, crosscutting with AHVD.

(ii) Designing and developing detail plan, tools and protocol for training, monitoring and certification (TMC) scheme: To be outsourced to ILRI: To scale-out the TMC programme, ILRI proposes to provide technical support to DDD by designing an updated training curriculum, training calendar and work plan. We also propose to develop protocols for training of trainers (ToT) and field trainings, tools for monitoring the trained actors, and policy support for establishing the certification and licensing programme. All this will be done in association with DDD with a view to build the capacity of DDD officials and to ensure ownership and acceptability of the products among them.

(iii) **Training course Development for dairy value chain actors: To be outsourced to ILRI:** Based on a rapid participatory assessment of knowledge, attitude and practices of value chain actors as well as research and development evidence generated by ILRI in Assam and elsewhere, ILRI will identify the training needs of value chain actors and set objectives for training. Along with the DDD, ILRI will develop a customized training course for all informal value chain actors (producers, traders, sweet makers and cottage processors). Based on previous experience and best practice, the course will be organised around modules supported by manuals, hand-outs and practical tools for better business and safer milk. ILRI will use participatory learning methods with visits to farms and processors, on the job training, mentoring and follow up. We will also explore technology applications.

The course will include topics related to improved dairy practices (technically and economically feasible in local context), clean and hygienic practices in production, handling, storage and marketing, improved milk and product quality and safety, reducing wastage and spoilage, value addition, prevailing rules and regulation for running informal milk/product business, business management, marketing and so on.

In order to draft the course, a writers' workshop will be organized to prepare the first draft, which will be reviewed and edited through an interactive process. This will include ILRI scientists, technical experts, targeted value chain actors and experts on adult learning techniques and communication product development. Drafted material will be field tested before finalization and will be translated to Assamese language.

Throughout the process ILRI will involve DDD officials and teachers and students of College of Veterinary Science (CVSc), Khanapara with a view to build their knowledge and capacity. Having a good working relationship with the National Dairy Research Institute (NDRI), Karnal, ILRI will also endeavor to bring them on board. ILRI's capacity building expert will spearhead the initiative. ILRI has already developed and used two sets of training courses one for dairy producers and another one for traders, but these courses need to be updated based on emerging issues (e.g. antimicrobial residue,

aflatoxin, climate change etc.) and opportunities for increased productivity. In addition, two new training courses need to be developed: one for sweet makers and another for cottage processors. ILRI will request the DDD to make adequate budgetary provision for printing the training manuals and handouts as per their requirement.

(iv) **Printing of training manuals by DDD:** Training manuals and handouts will be printed by DDD in English & Assamese language which will be practical tools for training producers, traders, sweet makers & cottage processors.

(v) **Training of Trainers (ToT) to be outsourced to ILRI:** In order to develop a sustainable system of training delivery, it is proposed to organize ToTs for resource persons in the project districts who would in turn impart training to the actual trainees. There will be four different types of ToTs based on the value chain actors targeted (producers, traders, sweet makers & cottage processors) and each type of ToT would be attended by about 5 resource persons from each project district. The ToTs would also be open to the district DDD and AHVD officials, interested resource persons from College of Veterinary Sciences (CVS) and Krishi Vigyan Kendras (KVKs),and representatives of producer and trader associations. The ToTs will be a imparted training using various tools and techniques including classroom coaching, classroom demonstration (e.g. milk test), field training, group discussion, role play, online professional tools/technologies, e-communication/WhatsApp group and so on. Adult learning technique will be taught in the training. Women trainers will be encouraged. In the ToTs, the resource persons will learn practically and in a hands-on way so that they can gather knowledge and confidence.

(vi) **Technical Assistance for rolling out TMC Program (to be outsourced to ILRI):** ILRI will provide technical support to DDD in rolling out the programme in the field. In the first few field trainings, ILRI will help the department facilitate but thereafter they will take the responsibility themselves. In organizing each training and follow up monitoring and certification, the department will follow the protocol and keep records of all the participants including their contact details and photographs. With the trainee's consent, all information will be entered in a computer database for future reference and follow-up during monitoring and certification and beyond. For quality checks, ILRI will make some field visits intermittently during training and give guidance to the resource person if anything is not satisfactory. ILRI will also serve as an active member of the State Advisory Body (JCMC) and contribute in planning the activities related to TMC. It will help the department in its policy initiative to link training certification with municipalities' licensing process and FSSA, 2006 registration process.

(vii) **Training implementation in the field by DDD:** Under the earlier World Bank aided project (AACP), Directorate of Dairy Development (DDD) and ILRI jointly piloted a training programme for milk producers and traders and effectively implemented them in the field with active support from the target group all relevant government agencies. DDD has already constituted a Joint Coordination and Monitoring Committee (JCMC) with representatives of Vety. Deptt., Health Deptt., Guwahati Municipal Corporation, ARIAS Society & ILRI to dovetail individual departmental initiatives towards improving milk quality and safety in informal value chain and to guide the whole Training, Monitoring & Certification (TMC) programme that is still in force. It is intended to replicate the same training implementation plan in all the project districts. Under this, training will be imparted to the target groups at their own convenient place and time in the field so that it could increase participation of the target groups (both male and female). Separate target groups viz Producer, Trader, Sweet Processor and Cottage Processors will be trained separately so that the customized training modules can be utilized as per the respective KAP gaps. Before implementation of the training in the field it needs to organize training of trainers (ToT) programme comprising of DDD & AHVD officials, AAU scientist, progressive farmer/trader/sweet makers and will try to use influential local opinion leaders as a resource person to

motivate the target groups. Continuous monitoring from the project implementation unit will be done to make these trainings successful.

(viii) **Training Monitoring:** Immediately after each training, a Hygienic Milk Monitoring Committee (HMMC) *(different committee for different set of milk market actors)* will be constituted among the trained actors to monitor the adoption of improved practices taught during the training by the fellow farmers/ traders/sweet makers/ cottage processors using a simple monitoring tool developed by the project. The committee will monitor the fellow members at least once in a month and submit the monitoring tool to the project officials for second level of monitoring and verification using the same tool. Project officials would consider it as another opportunity to motivate the trainees and help them in adopting improved practices in their own field. The monitoring process would be repeated several times in a span of six months to ensure that adoption of improved practices becomes a habit. It is believed that once the practices become a habit and after observing the benefits of the habit they would not return back to the previous practices in future. After monitoring for six months, a list of successful adopters of improved practices will be prepared by the local HMMC and submit the same to the project officials for issuing training certificate. All successful adopters will be awarded with a training certificate in a ceremonial distribution event to be attended by senior government officials as a mark of appreciation and honour to the successful trainees. DDD and ILRI had successfully demonstrated this monitoring intervention in a pilot scale in Guwahati under AACP and it is proposed to replicate the same in all the project districts with the technical support from ILRI

(ix) **Capacity Building of Govt. Officers on Lab Technology (to be outsourced to ILRI):** To follow the food safety regulations (FSSA-2006), food traded by value chain actors must be periodically tested for quality and safety. In order to build a food system that makes food safer, testing should be targeted, accurate and lead to appropriate action. Dairy officers will be designated as Food Safety Officers (FSO) by FSSAI with the mandate to check milk quality and to collect suspected milk samples from the market from time to time to test in their laboratories. In order to test milk quality, existing laboratories of DDD need to be strengthened, and capacity built for surveillance and response. For advanced testing, a system needs to be put in place so that samples are sent to the state laboratories or other FSSA accredited laboratories when required. Under this component, ILRI proposes the following activities-

- Developing protocol and quality assurance system under DDD for adherence to FSSA,2006
- Capacity building of government officers on laboratory technology
- Support for health risk assessment and risk communication in milk value chain under FSSA,2006

(f) **ILRI's Consultancy for Technical Backstopping for 7 years:** The International Livestock Research Institute (ILRI), Kenya will be engaged for technical assistance for Improvement of Informal Dairy Sub-sector in 16 APART districts of Assam & for facilitating transformation from informal milk sector to formal. The ILRI works to improve food security and reduce poverty in developing countries through research for better and more sustainable use of livestock. ILRI is a CGIAR research centre – part of a global research partnership for a food-secure future. CGIAR is a global research partnership for a food-secure future. CGIAR science is dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources and ecosystem services. Its research is carried out by 15 CGIAR centers in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations and the private sector. Since

no other consultancy organizations are there in the market with similar nature, capacity and business objectives of ILRI, SSS would be a preferred method of procurement of this consultancy service.

(g) **Project Implementation:** Project activities will be implemented through the operational PIU at HQ at Directorate of Dairy Development and at its project district officials. As the Directorate is in dearth of man power, it proposes to engage technical as well as functional manpower with suitable qualifications at operational PIU to be engaged from the open market in addition to the engagement of NGOs for districts for DCS formation and handholding. Officials also need some key capacity building in WB procurement procedures, DCS registration, cooperative management, milk value addition and exposure visit to advanced dairy state or institutions etc. Project will also reach out to AAU to involve graduate students in all the studies and assessments undertaken to build technical capacity for the future. This can be effectively done through ILRI who will supervise students from AAU involved in data collection and analysis. Four districts need rented houses with office furniture for running the project activities. Both HQ PIU and district PIUs will be automated with office equipments, office expenses, POL and TA, DA costs for the project officials during the project period

212. Cost Estimate: Total estimated cost for dairy informal activities will be around Rs. 5144 lakhs.

213. Institutional & Implementation Arrangements: The project activities would be implemented by the Dairy Development through its Project Implementation Unit (PIU) headed by Director and a Nodal Officer with the support of other officers and contractual staffs. The districts teams will be led by District Dairy officers supported by the contractual staffs and will be responsible for successful implementation of the project activities in the district.

214. Sustainability: To ensure sustainability of the adoption of improved practices by the milk market actors, it is proposed under the plan to consider motivation, need based capacity strengthening, financial (eg, credit and insurance linkages) and non financial (eg. certificate, license etc.) incentives for the market actors as the key elements. Besides, after the training it is proposed to monitor the trained market actors for six months to ensure adoption of improved practices before issuing training certificate. It is expected that once the market actors adopt improved practices for six months and make it a habit they would not go back to their previous practices if they see some benefits out of it. To sustain laboratory resources required for regular testing of milk samples under FSSA, 2006 it is proposed to incorporate all these components in the general budget of the department after 4th year of the project..

215. Results Chain and Results Framework

(a) **Results Chain:**

Segment	Activities	Sub Activities	Output	Outcome
A. MARKET	A.1 .Market assessment through mapping of market actors of informal dairy value chain	1. Physical assessment of distribution of market actors and Veterinary/Dairy infrastructure available using GIS application	1. Number, type and categories of market actors operating in each project areas 2. Number of formal and informal milk market operating, volume of milk traded, type of operation, limitations etc. 3.Well plotted number of target groups 4. List of target specific action plan and project interventions	Improvement(through HACCP measures) in existing microbial count, adulterants, antimicrobial residue and aflatoxin, sub-clinical mastitis cases and other associated risks in entire milk value chain.
	A.2 Assessment of human health risk in dairy value chain with particular focus on informal sector before and after interventions	1. Assessment of magnitude of risk posed by milk and milk products to human health 2. Assessment of adulterants, microbial load, antimicrobial residue and aflatoxin in informal/formal dairy value chain. 3.Assessment of prevalence of zoonotic pathogens like Brucella and Mycobacterium among the market actors.	1.Documentary evidence of type, magnitude, causes of these risks and their critical control points for mitigation. 2.Benchmark status of microbial count, antimicrobial residue and aflatoxin in milk 3. Benchmark status of zoonotic pathogens like Brucella among the market actors. 4.List of target group specific and	

Segment	Activities	Sub Activities	Output	Outcome
		4.Identification of critical control points in entire value chain 5. Repetition of same assessment at the end of the project for evaluation of improvement in risks	evidence based interventions to reduce risks in milk market	
	A.3 Establish peer monitoring & certification process for food safety in place	1.Regular milk sample collection and quality checking of milk market actors 2.Facilitate market actors for registration/licensing under FSSA,2006/ Municipality. 3. Obtaining training certificate for adoption of improved PoP a pre-condition for availing Municipality & FSSA registration/license. 4. Strengthening of existing lab infrastructures and capacity upgradation as per FSSA,2006 5.Development of lab protocols and hand holding	1.Number of milk samples tested every day, 2. Number of milk market actors registered and licensed under FSSA,2006.	1. Establishment of FSSA regulatory sytstem in place to regulate milk market 2. Assured milk quality in the market 3. Higher consumers' confidence on the quality, 4. Higher demand for milk and milk products
	A.4 Policy action to implement FSSA,2006 and other prevailing laws & practices	1. Notifying the existing Joint Coordination and monitoring committee (JCMC) as State Advisory Body under FSSA,2006 and constitution of JCMC in each project districts 2.. Notifying dairy officers as Food safety Officer 3. Linking Training, monitoring and certification as a prerequisite for availing registration and license under FSSA,2006 and municipality	1. Number of dairy officers notified as Food safety Officer 2. Number of JCMC in place for both state and district level	1. Better coordination amongst the enforcement agencies to uphold the provisions of food laws 2. Better consumers confidence and satisfaction on quality
	A.5 Linkages and support to market actors to run their business efficiently following prevailing laws & practices	1.Incentives and recognition of traders for adoption of improved practices. 2..Registration and licensing of Traders under FSSA,2006 and Municipality	Nos of Registered/Licensed trained traders under FSSA,2006 and Municipality	Milk marketed through traders will reflect better hygiene, standards and safety
	A.6 Formation of licensed Market Actor Groups for better market positioning & increase traceability	1. Formation of licensed market actor Groups among market actors for increasing traceability, access to inputs, services and market and to distinguish trained & certified from untrained actors	1.Number of licensed Market Actor Groups	1. Increased traceability of the groups, increased and better milk aggregation and market access, 2. Better coordination and cooperation among different category of market groups 3. Reduced cost of procurement/ transportation of farm inputs, 4. Right price for quality 5.Reduction in unemployment and poverty alleviation through dairying. 6. Women empowerment and participation in dairying, 7. Higher bargaining capacity for the group of milk market actors
	A.7 Consumers' awareness strategy and campaign particularly on food safety and zoonosis	1. Development of content for consumers' awareness and publicity campaign materials including flyer, poster, web setup, news, article, brief and technical support etc by ILRI. 2. Consumers awareness through	1. No. of awareness camps organized 2. No. of roadshows organized 3. No. of exposure trips planned	1. Increased Consumers awareness, confidence and acceptance for milk and milk products 2. Increased demand for milk and milk

Segment	Activities	Sub Activities	Output	Outcome
		print and electronic media, social media through mobile technology, debate and art competition, street play, exposure trip, road shows etc. during 4th and 6th year.		products.
B. PROCESSING	B.1 Linkages with WAMUL and other processors	1. Encouragement for supplying milk to formal milk processing sector 2. Convergence of DCS and processors	1.No of DCS federated into Milk Unions 2. No of DCS supplying milk to other formal processors	1. Increased volume of milk supplied to WAMUL/ Formal processor fold will be increased. 2. Increased volume of processed milk and milk products in the market.
C. AGGREGATION	C.1 Developing collection centres at each DCS for milk collection	1.Establishment of milk collection centers with testing facility, 2. Milk cans for milk collection	1. No of milk collection centers established at DCS level 2. No. of milk cans/SS milk pails supplied to DCS farmers	1. Organized system of milk aggregation 2. Quality is assured at the aggregation points 3. Inferior quality milk is rejected at the collection point itself
D. PRODUCTION	D.1 Formation of DCS among the interested trained producers under the informal dairy value chain	1. Formation of DCS among trained market actors for increasing access to inputs, services for production	1. Number of new DCS formed 2. Volume of milk handled by DCS	1.Organized milk production, better milk aggregation and market access, 2. Reduced cost of procurement/ transportation of farm inputs, 4. Right price for quality. 5. Women empowerment and participation in dairying,
	D.2 Assessment of critical need gap of old DCS and making arrangement for need based support	Assessing the performance of existing DCS located under periurban areas on parameters of milk volume handled and categorizing them under "Highly Performing, Performing and Non-Performing" and graduating them to the level of dairy entrepreneur with required support	1. No of old DCS supported	1. Increased milk volume, aggregation and market access,
E. CAPACITY BUILDING	E.1 Design and development of customized training manuals for producers, traders, sweet makers & cottage processors	1. Design and development of manuals to address the knowledge ,attitudes and practices(KAP) gap among the market actors for adopting improved practices in entire milk value chain 2. Production and printing of training manuals for all targeted market actors 3. Repetition of same assessment at the end of the project for evaluation of improvement in KAP	1. Customized training manuals for producers, traders, sweet makers & cottage processors	.1. Adoption of improved PoPs in milk value chain 2. improvement in milk quality, safety, increase productivity, reduce incidence of disease, reduce spoilage, increase consumers' satisfaction and demand
	E.2 Implementation of Training of Trainers (ToT) and field training for all market actors	1. Training of trainers 2. Training of market actors as per customized training tools 3. Formation of Hygienic Milk Monitoring Committee (HMMC) for self monitoring among the groups	1. List of different categories of market actors trained. 2. List of location wise Hygienic Milk Monitoring Committee (HMMC) formed.	

(b) **Results Framework :**

Parameters	Unit	Baseline	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Informal dairy producers under APART	Nos	00			2000	2800	2800	2000	9600
Milk production/ farmer (12 kg/household/day, 3 cows/household, 2 cows in milk)	Kg/day	00			24000	33600	33600	24000	115200
Cumulative milk production/ day (without considering the annual growth)	Kg/day	00			24000	57600	91200	115200	230400
Household Retention by farmers/day (10%)	Kg/day	00			2400	5760	9120	11520	23040
Marketable surplus/day(90% of production)	Kg/day	00			21600	51840	82080	103680	207360
Milk marketable surplus from DCS members (50% of the total milk surplus)	Kg/day	00			10800	25920	41040	51840	103680

Parameters	Unit	Baseline	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Milk marketable surplus from rest non DCS members (50% of the total)	Kg/day	00			10800	25920	41040	51840	103680
Milk marketed to organised processors by DCS members (assumed 10% in Y3, 15% in Y4, 20% inY5, 25% in Y6, 30% in Y7)	Kg/day	00			1080	3888	8208	12960	31104
% of milk sold by DCS to formal processors	**%**	**00**			**5**	**7**	**9**	**11**	**14**
Milk sold to individual market actors(traders/sweetshop etc) by DCS	Kg/day	00			9720	22032	32832	38880	72576
Total milk marketed to individual market actors by DCS and rest 50 % non DCS members	Kg/day	00			20520	47952	73872	90720	176256
Average milk procured by each traders (600 traders in Y3, 1600 traders in Y4, 2600 traders in Y5 & 3200 traders in Y3)	Kg/day	00			34	30	28	28	55
Milk price offered by formal processors (as per WAMUL information)	Rs/kg	32	38	38	39	40	41	41	42
Milk price offered by market actors (traders, sweet makers & cottage processors)	Rs./kg	40	45	50	55	60	65	70	75
Value generated by producers selling milk to formal processors (A) in thousand	'000 Rs./day	00			42	155	333	537	1314
Value generated by producers selling milk to individual market actors (B) in thousand	'000 Rs./day	00			1129	2877	4802	6350	13219
Total value generation from milk production (A+B) in thousand	'000 Rs./day	00			**1171**	**3032**	**5135**	**6887**	**14533**

216. Risks and mitigation measures:

Sl	Risks	Risk Mitigating Measures
1	If policy decisions are not taken to recognise dairy officers as Food Safety Officer, not notifying JCMC as State Advisory Body and non accreditation of the milk testing laboratory of DDD at head quarter as accredited laboratory under Food Safety and Standard Act (FSSA), 2006	Efforts would be made to generate evidence from the past project activities and try to influence policy makers .The power of Food Safety Officer to be delegated to dairy officials is already under process.
2	Poor interest of the market actors to adopt improved practices and their resistance towards changes.	To overcome the problem, it is proposed to conduct the knowledge, attitude and practice survey for market actors at the beginning of the project so that interventions can be made demand driven and could address their need. In the initial exercise to be done by ILRI, it is proposed to identify the financial and non-financial motivating factors for them. In addition, for the non adopters, it is proposed to have the legal and administrative power under FSSA,2006 to cancel their licenses/registrations or to take other actions as provided under the act.
3	Discontinuation of the monitoring of the improved practices to be adopted by the informal market actors	Strict mechanism will be adopted both in HQ and at district level
4	Conflict with the formal sector players	The area of operation of both the sectors are different with different target groups. It is proposed to work closely with the formal sector players to overcome those problems.
5	If the risk assessment studies not allowed to be conducted under the project	Efforts need to be put to influence the project authority to allow to conduct the studies at the beginning and at the end to arrive at the outcome of such initiatives
6	Non-Development of laboratory infrastructure and manpower	Support from other schemes/projects will be explored
7	Lack of support from related departments	To increase support from the related departments like A.H & Veterinary, Health Services, Municipality, WAMUL , FSSAI and ARIAS, it is proposed to strengthen the existing Joint Coordination & Monitoring Committee (JCMC) comprised of all relevant above departments as a govt. notified body so that one can have interaction at regular interval and can dovetail the individual departmental initiatives towards addressing the common cause

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Sub-Component C.1.4: Cross cutting areas of Formal and Informal Milk Sectors, to be implemented by Animal Husbandry and Veterinary Department (AHVD)

217. Sub-component brief: Interventions in formal and informal milk value chains, which are expected to cover about 52,000 dairy animals, will be implemented by the Animal Husbandry and Veterinary Department (AHVD) at state level and ATMAs at district level. The informal milk value chain interventions will be anchored by Directorate of Dairy Development while the formal milk sector interventions will be anchored by West Assam Milk Union (WAMUL). International Livestock Research Institute (ILRI) expertise will also be used particularly in the informal dairy sector. Interventions will focus on (i) providing artificial insemination services, feeding and animal health; (ii) capacity building through skills training, demos and exposure visits.

218. Sub-component objectives: Following are the objectives of this sub-component

(a) The main objective is the better health care and management to the animals of APART districts, both under formal and informal sector.

(b) To provide training to the farmers under informal sector with the help of competent departmental experts in order to enhance the farmer's capability to adopt new practices of animal health care and management, breeding, feeding etc.

(c) To provide information to the farmers about the better feeding practices in time for better production and productivity and thereby reducing the cost of milk production.

(d) Creation of gainful employment in the organized dairy sector

219. Background: The Animal Husbandry and Veterinary Department, Assam (AHVD) has been providing Animal Health Care facilities/services (including artificial insemination) to livestock farmers and training to farmers and other actors in the livestock value chains. Further Department helps farmers improve feeding practices through a network of District A. H. Veterinary Offices, Veterinary Hospitals/Dispensaries, AI Centres, Veterinary Sub-Centres etc. Recently, the AHVD has established a frozen semen station in Barapetta (Distt. Barpeta) which has been awarded A-Grade by Central Monitoring Unit, Government of India. In light of the above background, it is envisaged that the Department will provide support to both Directorate of Dairy Development (for informal milk sector) and West Assam Milk Union Limited (for formal milk sector) with its services and facilities as a part of APART interventions.

220. Activities to be financed (Indicative list):

(a) **Health care services**

(i) **Immunization programme**: Vaccination programme for the animals under the Dairy sector in the selected areas of APART district will be provided on a routine well planned vaccination calendar. Cold chain will be maintained from the central store at Institute of Veterinary Biologicals (IVB) Khanapara to the project site through District Implementing Agency (District Veterinary Office) to Block level field implementing units (Block Veterinary Dispensaries). The Dispensary level staffs will carry out the vaccination programme in the field. Veterinary Officers (V.O.s) will supervise the programme under overall guidance of the District Veterinary Officer of the Selected project Districts. The Para-vets, Vaccinators, Gopal mitras of the local areas will actively be entrusted for vaccination and other related programmes. About 35 lakhs animals will be covered for FMD, HS, BQ and Brucelosis under the

programme in phase manner covering formal and informal dairy sector. Vaccination calendar provided in annexure *[C-1.4 (a)].*

(ii) **Reproductive health management:** The high yielding milch animals are frequently encountered with some sorts of reproductive ailment losing its potential productivity. These are associated mainly with nutritional deficiency, faulty management practices, infectious diseases etc. which needs immediate attention for correction with proper diagnosis. It is proposed that reproductive health management camps especially in the areas where cross bred and high yielding animals are reared for commercial milk production will be organized with professional experts in the related field under active participation of the Local Veterinary Network of the Department. All together 559 & 210 nos of Reproductive health management camp for formal and informal dairy sector respectively in the projected district in cluster/ block.

(iii) **Mastitis management:** Sub clinical & chronic Mastitis is a common phenomenon in the high yielding animals which cause huge economic loss to the farmers. This has also human health issues from the point of infected milk as well as antibiotic residues milk due to indiscriminate use of antibiotic infusion. Main causes are the unhygienic management practices, nutritional deficiency, unscientific milking practice etc. Under the proposed intervention it is proposed to provide technical guidance to the farmers, diagnostic facilities and standard operating practices for dairy farming through skill upgradation.

(iv) **Health Camps:** AHVD proposes to provide routine health check up camps under the project basically for the production related diseases at cluster level to cover all the milch animals besides others. Technical experts of the AHVD network will provide services in the camp and vaccination also carried out during the camp. At least 300 animals will be covered directly in the camp and indirectly another 500 animals will be provided advisory services. All the farmers included in the camp will be provided basic awareness on health management, feeding, production related issues in the camp. All together around 15000 nos. of health camps will be organized during the project period @ 12 camps per DCS in 16 project districts. The animal health camps will not only be a treatment camp but also act as a farmers' field school. Preliminary knowledge on different diseases like parasitic disease eg. *Fasciolasis, Paramphistomiasis*, A*scariasis* etc, metabolic diseases like ketosis, milk fever etc and infectious diseases prevalent in the state like FMD, HS, BQ diseases will be provided to them along with preventive measures, nutritional management etc. The animal health camps will be organized as per feasibility of nearby DCS having sufficient space and facility. All the stakeholders including Dairy Development Directorate and local veterinary personnel, gopal mitras and Mobile AI Technicians (MAITs) will participate in the camps. There will be a strong focus on women farmers who are specifically targeted under this project. The master trainers (ToT) from veterinary department will interact with the farmers to address their knowledge gap. Audio visuals on animal husbandry practices will be shown to the farmers and leaflets/ booklets will be provided to the farmers besides medicines for deworming, mineral mixture, liver supportive etc. Wide publicity will be provided to ensure farmers active participation in animal health camps cum farmers' field school before organizing camps. The Veterinary Officers will also attend the ailing livestock at farmer's doorstep if sought for. The department normally emphasizes for deworming of Cross bred (CB) cattle as due to the humid and hot climate in the state parasitic disease infestation is relatively high. Medicines for deworming are prescribed and sometimes given free of cost by the department. In the proposed animal health camps, the farmers will be made aware on regular and timely dosing of dewormer to the their cattle.

(v) **Strengthening of District Disease Diagnostic Labs in 7 districts:** The AHVD infrastructures in the diagnostic facilities lacks sufficient logistics and consumables despite of the fact that modern and well equipped labs are most essential to provide timely services by supporting field

veterinarians for proper diagnosis. In light of the above, 7 district disease diagnostic labs are proposed to be included under the project for strengthening with minimum equipments and lab consumables. The skill development of the departmental officers will be done in North East Regional Disease Diagnostic Laboratory (NERDDL). The awareness among farmers regarding importance of lab diagnosis will be generated in the Health Management camps.

(b) **Breed Improvement Program through Doorstep AI Services**

(i) **Door step AI service delivery as per the routine programme of the AHVD through existing AHVD network & induction of Gopal Mitras (GMs):** The states own milch animal population is very scanty producer which is commercially unviable to rear for fulfilling the present demand. Under breed improvement, as per the cattle breeding policy of Assam, exotic inheritance should not go beyond 62.5% with the local animals for better adaptability. AI is the most potential means for breed upgradation. Well planned service delivery for the programme is the key to success with tangible results. It is proposed to provide routine Door Step AI services with the existing AHVD network as well as induction of Gopal Mitras in the non covered areas by AHVD network. The supply chain of the frozen semen from the production center at Barapetta to the field level AI centers is presently managed by Assam Livestock Development Agency (ALDA) through 15 Departmental Frozen Semen Banks (FSB) of the state. Of these 15 FSBs, 12 FSBs will be covering the milch animal population in 16 project districts. A.I. programme of the department is carried out by ALDA and frozen semen are made available from A-grade Frozen Semen Production Centre (FSPC), Barapetta. The present breeding policy suggests Jersey semen for cross breeding as a whole while Holstein FS in specific areas. The A.I. doorstep delivery is done by departmental vets, paravets and GMs trained during AACP. All the dispensaries, sub-centres, A.I. centres are instructed to carry out castration of scrub bulls to encourage the farmers to adopt CB programme through A.I. The department has already initiated efforts to adopt INAPH software of NDDB under ALDA. The paravets/A.I. Worker/GM will be trained on INAPH in time once it is launched. On the other hand, artificial inseminated cattle will be ear tagged by A. I. Workers with the support of ALDA. For the project districts the INAPH programme will be supported by APART under which the cost of tags, tablets, and capacity building will be carried out through the departmental network in the AHVD training institutes.

(ii) **Convergence with existing programmes of the Govt.:** The routine departmental activities like semen production and distribution by ALDA, Livestock Insurance under NLM to be implemented by ALDA, Fodder development programme under AHVD, awareness generation etc will be co-ordinated with the project by AHVD so that the farmers gets the entire package of services in a holistic manner. Support for setting up small dairy production units, Indigenous milk product manufacturing units, cold chain & milk processing units scheme under Dairy Entrepreneurship Development Scheme (DEDS) could be converged with the proposed interventions for better reflection of growth in the sector.

(c) **Capacity building of the farmers, Para-vets and Local Service Providers- Gopal Mitras:** The major part of the project is capacity building of farmers, paravets, laboratory staff, GM and vets to carry out the activity successfully. ILRI will prepare the training module for each stakeholder. ILRI will make TOT/Master Trainer for each stakeholder and training material will be provided to the department for printing and distribution. The TOTs who were trained at BAIF, Pune and the service of TOTs will be utilized to train the GM under this project.

(i) **Trainings of farmers in informal dairy sector**: Capacity building of the farmers will be carried out for 5 days in separate time with different objective. This training will follow the 1:10:4 approach(adoption of improved practices by at least 4 persons out of 10, i.e 40% adoptability rate). Besides normal dairy management training, the department envisages to build skill development of

farmers so as to enhance their performance from production to market level. The lead farmers will be identified from the farmers field school and will be the part of skill development programme for future farmers field school.

(ii) **Training of Gopal Mitras and refresher training for para-vets:** Gopal Mitras will be selected from the areas where the AHVD network is not existed but have huge potentiality for A.I. They will impart training under normal course calendar of the Department/ Assam Livestock Development Agency (ALDA) following the SOP and provide kits for the service delivery. Existing Para-vets will be provided with hands on training on the improved service delivery practices with updated knowledge on husbandry practices, ration balancing, systematic AI data management under INAPH. The paravets & Gopal mitras will provide AI services at farmers door step and also provide the advisory services for nutritional management, mineral mixture supplementation, disease prevention and provide need based first -aid and this will be paid service on a normal cost basis.

The project will results in a new curriculum for training of paravets & GM to be developed in coordination with ILRI and involving contributions from other organizations such as FAO, Heifer, Wageningen University etc. All training materials and supporting service delivery tools and apps (eg. like Ration Balancing Software, video clips for farmer extension) will be made available on Tablets & Portable Projection to play videos for farmers will become a fundamental tool of the training.

(iii) **Training of the Laboratory staff:** the laboratory staff of the Disease Diagnostic Laboratory (DDL) of the Department is proposed to be trained on updated lab diagnostic procedures at North East Regional Disease Diagnostic Laboratory (NERDDL), Khanapara. A well designed training programme will be organized by the NERDDL and refresher hands on training will also be provided at DDL level. Training calendar is provided in *annexure C-1.4 (b).*

(d) **Feeds and Fodder**:

(i) **Mineral Supplementation**: Mineral deficiencies in crossbred/ local cattle are a major cause of concern in regards to fertility, low productivity and repeat breeding etc. Hence, the department proposed to make the department aware on the need of feeding od mineral mixture at recommended dose. In the proposed Animal Health Camps, mineral mixture will be given to the farmers free of cost and will be instructed to purchase quality mineral mixture from the pharmacies or veterinary clinics run by un-employed vets. At the end of training programme to DCS members, each member will be provided mineral mixture for one animal for one month.

(ii) **Concentrate Feeding**: Concentrate feeding is important for high yielding as well as sound health of livestock. The farmers will be make aware of feeding of concentrate feed of different types at different stages during the animal health camps. For this provision for training of the DCS farmers are kept in this project. The GMs and the paravets will be trained on importance of nutritional management in the refreshers training to be held under this project. As the branded concentrate feed is available in the nook and corner of the state, the farmers will be provided sufficient knowledge regarding quality concentrate feed and source and will be advised to buy feed only from the empanelled producers. The quality of the feed will be tested at the departmental feed testing laboratory or Animal Nutrition Department of AAU, Khanapara. The farmers/societies will be linked to the dealers so that they can purchase it at whole sale price. The under or over feeding is also a matter of concern. The vets/paravets/GM/progressive farmers/educated farmers will be asked to download the ration balancing App of NDDB, so that they can find out accordingly.

(iii) **Fodder**: The project will organise demonstration programme on fodder for the farmers under the formal/informal dairy sector through ATMA. Necessary provision has been kept under sub component C.1.1.

(e) **Insurance:** The insurance of livestock can be a major relief for the farmers at sudden death of an animal. The programme has already been carried out by ALDA under NPCBB only for cross bred animals in certain districts. On the other hand, the NLM has proposed to carry out livestock insurance in all the districts of the state. The farmers under the APART will be able to avail the insurance programme under NLM at 10:90.

221. Illustrative costing: The major costs will be towards burcellosis vaccination, Foot and Mouth Disease (FMD) vaccination, Hemorrhagic Septcemia (HS) and Blackleg Quarter (BQ) vaccination, animal health (including reproductive and mastitis management) camps, lab consumables, California Mastitis Test (CMT) kits, training and capacity building etc. A total expenditure of around Rs. 4049 lakhs is planned on the cross cutting areas of animal husbandry activities. Details are provided in the cost table.

222. Results Chain and Results Framework

(a) **Results Chain**

Sr	Activity	Sub-Activity	Output	Outcome
A.	**Production**			
1	**Breed up-gradation through AI**			Increased no. of cross bred calves 2. Increased milk productivity
i.		Refresher training for GM &VFA on AI	No of GM & Paravets trained	
ii.		Doorstep Artificial insemination with improved semen	No of AI done	
B.	**Health Coverage**			
1	Bulk Procurement of vaccines for FMD, HS&BQ, and Brucellosis	MoU with Supplier and procurement & procurement of vaccines	No. of vaccines procured	Reduced incidence of diseases
2	Cold chain management for vaccine preservation & transportation	Procurement of Deep freezer and tharmostat boxes	No of deep freezer & thermostate boxes procured	
3	Immunization	Vaccination against FMD, HS BQ, Brucellosis	No of animal coverd against FMD, HS BQ, Brucellosis	
4	Organization of Health Camp	Treatment camps	No of camps organized	Increased recovery of diseased animals
5	Organization of reproductive health and mastitis management camp		No of camps organized	1.Improved herd and reproductive health & reduced incidence of mastitsis 2. Increased productivity
i.		Assessment of herd health, reproductive health & mastitis		
ii.		Documentation & reporting of the health status		
iii.		Technical guidance for prevention & treatment		
C.	**Capacity Building**			Improved knowledge, capacity & skill
1		Extension materials development for reducing incidence of diseases & increasing productive & reproductive performance	No. of extension materials developed	
2		Training of DCS Members on dairy management	No. of member trained	
3		Refresher Training to GM & VFA	No. of GM & VFA trained	
4		Exposure visit of Project Officials	No of project officials participated	

(b) **Results Framework**

Indicator	Baseline	Y1	Y2	Y3	Y4	Y5	Y6	EoP/Y7
No of Beneficiaries				2000	4800	7600	9600	9600
No of Gopal Mitras trained and established.		0	17	32	37	42	46	46
No of cross breed calf produced			270	1395	3150	5535	8370	8370
No of deep freezer & thermostate boxes procured		5	11	21	32	44	55	61
No of animals covered under immunization programme ((FMD, HSBQ, Bruceloosis).		207896	617528	1168615	1798502	2444734	3105421	3727758
No of animal covered against HS BQ,		183908	368147	494471	568821	584461	598421	563221

Indicator	Baseline	Y1	Y2	Y3	Y4	Y5	Y6	EoP/Y7
No of animal covered against Brucellosis		23988	41484	56616	61066	61771	62266	59116
Doses of FMD vaccines required		367816	736295	988942	1137644	715672	743622	673222
Doses of HS BQ vaccines required		183908	368147	494471	568821	584461	598421	563221
Doses of Brucellosis vaccines required		23988	41484	56616	61066	61771	62266	59116
CMT Kit distributed	0	291	560	894	1143	1313	1378	1378
No of animal health camps	0	736	2348	4512	7096	9784	12565	15111
No. of reproductive health & mastitis management camps	0	232	412	608	689	736	769	769
Kg of mineral mixture distribute	0	0	1800	7470	11700	15930	18900	18900
No of Tablets provided to Gopal Mitra	0	0	17	32	37	42	46	46
Training of veterinary officers on lab technologies		1	2	2	2	2	2	2
Training of DCS members on Dairy Management			20	83	130	177	210	210
Refresher training of VFA		15	30	40	50	50	50	50
Refresher training of Gopal Mitra		0	17	32	37	42	46	46
No. of exposure visits of Block vety. Officer.		2	3	3	3	3	3	3

Sub-Component C1.5: Fisheries Value Chain

223. Fisheries Value Chain: Over view: The fish value chain, is to be implemented by the Director of Fisheries and District ATMAs and Department of Fisheries, in collaboration with World Fish Centre (WFC) and private sector partners. This sub-component will focus on: (i) improving the quality of the inputs such as fish seed and feed for aquaculture, (ii) increasing the fish productivity and production from the pond/tank aquaculture systems, (iii) increasing fish production through culture-cum-capture fisheries activities in the beels, (iv) promoting diversification of fish species – particularly genetically improved strains - in combination with Indian major carps in the culture systems, (v) improved post-harvest management, value addition and marketing of produce by setting up fish farmer common service centres (CSCs.).

The project therefore targets the following

Sl.	Activities	Unit	Physical Target
1	* Establishment of Seed Multiplication centre for fast growing genetically improved fish strains for production of high yielding fish seed	Number	4
2	$ Improved Brood stock management and upgradation of hatcheries for quality seed production	Number	5
3	Monoculture/Polyculture technologies – in tanks and ponds	ha	1200
4	Culture-cum-capture fisheries technology demonstration in beels	ha	2225
5	Climate resilient Paddy-cum-fish integrated farming	ha	500
6	Productivity enhancement		
i	Pond & tank fisheries from existing 2.5- 3 tonne	tonne	5 - 6
ii	Beel fisheries from existing 0.5-1.0 tonne	tonne	1.5 - 2
iii	Fish-paddy integration from existing 0.5 tonne	tonne	1.5
7	Credit linkage/ insurance workshop	Number	100
8	Field Days	Number	400
9	Awareness camps	Number	500
10	Beneficiary farmers	Number	27350
11	Value addition		
i	Fish processing (units)	Number	10
ii	Aeration devices for fish transportation van	Number	100
iii	Flake Ice manufacturing units to CSCs	Number	13

**Seed multiplication Centres and $Brood Stock management with upgradation of hatcheries will be taken up in selected Govt. fish farms.*

224. Fish cluster development will broadly focus on: (i) establishment of seed multiplication centres for quality seed production with genetically improved strains of Indian major carp (Jayanti Rohu), Gift tilapia and Pangasius in project districts on zonal basis, (ii) establishment of new hatcheries with improved brood stock management program for production of high yielding carps, (iii) novel monoculture and polyculture technology demonstration in pond fisheries for market demand based fish species, (iv) technology demonstration in beel fisheries by combining indigenous nutrition rich small fish (e.g. mola) with Indian carps supported with species/stock enhancement, stock improvement and habitat management/improvement, (v) pen culture on pilot basis to demonstrate community involvement in productivity enhancement, (vi) promotion of climate resilient paddy-cum-fish integration, (vii) creating adequate post-harvest and market infrastructure facilities, (viii) capacity building, training, extension and exposure visits of farmers, awareness programs and field days on climate resilient aquaculture and fisheries and developing and implementing supporting policies and programs. These actions will provide livelihood options and higher incomes for fish farmers and rural community, improve their nutritional status, generate employment opportunities to the local population, including women and youth in fish culture and activities related to harvest and post-harvest management and value addition

225. Sub-component Objectives:

(a) Production of quality seed and feed, enhancement of fish production, post harvest management including value addition and entrepreneurship development through Farmers Producers Organization are the main objectives of project intervention under fishery sector

(b) Achieve a ***sustainable increase in the production*** of fish from pond aquaculture and small scale beel fisheries

(c) Facilitate **fish value chain and *collective entrepreneurial spirit* development** leading to sustainable "small farmer inclusive business enterprises

226. Major Activities

(a) ***Sustainable increase in fish production:*** Contextualize, validate and promote scientific approaches (e.g. package of practices, better management practices, demonstrations, and cluster management systems) to optimize the joint contributions of pond aquaculture, beel fisheries and fish value chains in selected clusters. In the pond aquaculture the main aim is to augment the fish productivity from the present level of 2.5 -3 tonnes/ha/annum to 5-6 tonnes/ha per annum by:

- Introducing genetically improved strains of Jayanthi rohu and mola/ puthi in polyculture;
- Gift Tilapia and Pangasius in monoculture systems in the ponds;
- Stocking of advanced fingerlings (≥100mm);
- Providing supplementary formulated floating pelletised feed for carp and gift tilapia/pangasius farming;
- Better fish pond management including water quality management and health care, disease diagnosis, management and treatment; better harvest and post-harvest management.

In the case of paddy-cum-fish integrated farming, semi-intensive/intensive systems will be promoted as a climate resilient technology for reducing GHG emissions as a new technology for augmenting fish production in paddy fields. In this system of integrated paddy-cum-fish farming culture of gift tilapia (all male) and Indian carps will be promoted along with raising paddy in two crops. It is envisaged that by adopting this technique, the fish production from the paddy fields could be increased to 1 - 1.5 tonnes per ha. This will provide the benefit of double cropping and increased income to the beneficiaries.

Technology demonstration in beel fisheries will be by way of combining indigenous small fish species (e.g. mola) with Indian carps, stock enhancement, species/stock improvement and habitat management/improvement. This may lead to production enhancement from the present level of 0.5-1.0 tonne/ha/yr to 1.5 - 2 tonnes/ha/yr. Communities' participation in all stages of development and post-development management will be ensured to achieve sustainable production and conservation of the common property resources. In doing so, knowledge gathered from the two studies taken up during AACP such as (i) Biodiversity in beel fisheries in Assam and (ii) Establishment of exotic carps in natural water bodies of Assam will be taken care of. The former study taken up during 2007-08 by the Institute of Advanced Studies in Science & Technology, Assam during 2007-08 found that the beel fisheries taken up for study in different districts fall under Grade III category of biodiversity status and therefore indicated clearance from biodiversity point of view for taking up development interventions. The second study was undertaken during the same period (submitted in March 2009) on 'Establishment of population of Exotic carps with special reference to Common carp, Grass carp and Silver carp in the natural water bodies of Assam' with consultancy services by Central Inland Fisheries Research Institute (CIFRI), ICAR, Kolkata. CIFRI studied 45 beel fisheries in Assam in

different seasons and came out with the findings that these three exotic carps have not established in any of the open water bodies in Assam even though these are regularly stocked for enhancement of fish production. The beel fisheries developed under the project were however not stocked with the exotic carps.

Eighty percent (80%) cost of all production related demonstration programmes will be borne by the project while the beneficiary shall bear 20% of the cost in the form of labour or cash as the case may be. POPs will be developed, validated and contextualized for maximizing the aquaculture productivity of the selected clusters, keeping in view the aforesaid management practices. In doing so, lessons learned from previous AACP and various aquaculture better management practices promoted by national and international fisheries research organizations (e.g. state agricultural universities, ICAR institutions, World Fish) will be considered. While finalizing POPs for the selected clusters, special attention will be given to sustainable intensification of pond aquaculture, increasing diversity and productivity of beels and improving fish value chains, including food safety and post-harvest. **The POPs will be nutrition-sensitive, Climate-resilient, gender-sensitive and at the same time responsive to market needs**. The POPs for production clusters will be integrated to take advantage of genetically improved strains (e.g. Indian carps, GIFT tilapia), quality seed, efficient feeds and feeding systems, improved health/disease management and culture practices. In addition, novel polyculture technologies will be promoted by combining indigenous small fishes (e.g. mola) with Indian carps to optimise economic and nutrition benefits to the communities. The POPs for increasing diversity and productivity of beels will consider stock enhancement, stock improvement, habitat management/improvement and governance system strengthening.

(b) ***Fish value chain and collective entrepreneurial spirit development:*** It is one of the most critical phases of activities which needs detail assessment of the status at every stage of the value chain to identify the gaps and opportunities for intervention. Develop models (e.g. CSC-common service centres, FPO-farmer producer organisations) to promote collective entrepreneurial spirt. A key project thrust will be on enhancing agglomeration of producers to improve economies of scale in producing, processing and marketing of fish. Fish value chain action plans will be developed and implemented through strengthening of farmers' societies and cooperatives for both production and marketing. Cluster specific business plans (e.g. production of small sized fish for marketing in live condition) will be developed to support the functioning of proposed FPOs and CSCs. Innovative communication and information tools will be utilised to operationalize the small farmer inclusive business models.

(c) **Market Led Production:**

(i) **Production technologies**: The main objective of market-led production is to understand consumers' choice and preferences of the specific type(s) of a commodity like size, quality, availability, etc. In the case of 'fish', there appears to be market demand for (i) catla and rohu of size 1-2 kg, (ii) indigenous nutrient rich small fishes like mola and puthi (iii) small sized Indian carps in live condition,(iv) live fishes like snakeheads, magur and singhi. The consumer and market study findings will be used to develop/update appropriate POPs and business models at cluster level to meet the market-led production requirements. **Production technologies responding to market needs** will be developed and widely disseminated for subsequent replication by large number of farmers

(ii) **Fish Seed**: In respect of fish seed, there is strong demand for quality seed of genetically improved fish species of size ranging from 50mm to 150-200 mm. The project therefore will explore approaches and business models (e.g. establishment of Multiplication Centres (MC) for genetically improved fish strains such as Jayanthi rohu and GIFT Tilapia, establishment of commercial hatcheries and nurseries) appropriate for production clusters through a systematic study. The study

findings will be used to attract public/private investments. Mechanisms to ensure seed quality through **seed certification programmes** by Government will be initiated so that private investors could differentiate their product in the market

(iii) **Fish Feed**: In respect of fish feed, there is strong demand for quality feed. The project would bring in private investment for setting up fish feed plants using locally available ingredients. For this to happen, there is a need for systematic **studies in fish feed value chains in Assam**. This will identify constraints and potential opportunities that exist in the state for private sector investment in feed industry with support from the project

(d) Understanding climate related risk factors to the sustainability of fish production clusters and devising appropriate POPs to address the identified risks is very important. **Wider promotion of validated climate smart technologies** and management approaches to cover all the fish and beel clusters in Assam would be given top priority. Some of the activities would include SGDs, stakeholder meetings, demonstration of climate smart aquaculture management practices and technologies.

(e) **Capacity building programmes (Training/ workshop/ Field days/ awareness programmes)**: Special efforts in the form of technology transfer, capacity building and extension support, will be made under the project to make farmers aware about different best farming practices available for adoption in the fish culture systems to increase productivity, production and value addition. Short duration training and exposure visits for beneficiary and neighbouring non-beneficiary farmers will be taken up to enhance their performance and involvement in value chain development . Workshops will be organized on intensive scale for all stake holders such as beneficiary farmers, neighbouring non-beneficiary farmers, aggregators, other market actors including identified input dealers. Technical and management support for the training and exposure visit of the stakeholders will be availed from AAU/ CoF, KVKs and ICAR fishery institutes such as CIFRI (Kolkata), CIFA (Bhubaneswar), CIFE (Mumbai), CIFT (Cochin), CFTRI (Cochin) etc. The capacity enhancement of implementing staff of the Department both for technical and office staff will also be ensured under the programme. Need based exposure visit of technical officers within and outside country will also be provided under the project. In addition, field days will be organized on the day of sample netting and harvesting of beneficiary ponds to show the benefit of improved farming practices to the neighbouring non-beneficiary farmers in and around the clusters and its impact on increased productivity and income generation. This will motivate them for adoption of new technologies as 'seeing is believing'.

Capacity building/ training to the beneficiary fish farmers as well as non-beneficiary farmers will be imparted by Assam Agricultural University (AAU)/ College of Fisheries, Raha (CoF) on the activities related to the project as agreed upon and to retain uniformity with other departments. To accomplish this, the AAU/CoF will develop training module and curriculum in collaboration with WorldFish. Adequate fund provision for these activities will be made in the cost table of the AAU.

All cost relating to Capacity Building programmes of stakeholders will be borne by the project and there shall be no beneficiary share

227. Policy & Regulatory Environment

(a) The Assam Fishery Rules, 1953; The Assam Private Fisheries Protection Act, 1935; The Assam Grant of Fishery Subsidy to Private Fish Farmers and Piscicultural Society Rules, 1971; The Instruction under the Assam Grant of Fishery Subsidy to Private Subsidy to Fishermen/Primary Cooperative Societies Rules, 1971; and The Indian Fisheries Act, 1897 **Deals with settlement of fisheries in the state of Assam.** Amendment of these rules to empower the actual beel users for managing sustainably the beel fisheries resources for improving their livelihoods has been proposed. To make the

Act/Rules more comprehensive, besides the beel fisheries, development and management of capture fisheries in rivers, canals, derelict water bodies and aquaculture in tanks and ponds, conservation of the aquatic resources for protecting the biodiversity, etc., need to be incorporated in line with the Model Inland Fisheries and Aquaculture Act, circulated by the Ministry of Agriculture in the year 2005 with recent revisions. The GoA accords priority to reform the Act/Rules and make them comprehensive.

(b) **Assam Fish Seed Act, 2005 & Fish Seed Rule, 2010**: The Assam Fish Seed Act, 2005, supported by the Fish Seed Rule 2010, is an Act to regulate the quality of fish seed for production, marketing and stocking of water bodies in the State of Assam. Suitable suggestions for amending the Fish Seed Act/Rules incorporating the provisions/norms as contained in the guidelines of the Ministry of Agriculture, GOI for fish seed certification and hatchery accreditation issued in the year 2010 have been made available to the Department of Fisheries, recently by the World Bank.

(c) The state does not have a comprehensive **Fisheries Policy** as yet. There is a need to have a comprehensive Inland Fisheries Policy for ensuring sustainable development and management of capture and culture fisheries in the inland fisheries resources of the State - riverine, beel, derelict waters/flood plain lakes, tanks and ponds, and reservoirs

(d) Limited number of acts and rules now govern the fish trade in the state. There is no fish marketing policy in place, except issue of license to traders (importers) by municipalities. The Assam Fish Seed Rule, 2010 provides only license to fish seed importers and exporters with no provision for any regulatory measures. Assam Fishery Act/Rules, 1953 have a simple provision prohibiting sale of undersized fish of a few species during the period from August to October. Fish trade license to wholesale and retail traders in Guwahati city are issued by Guwahati Municipal Corporation (GMC) under GMC Act, 1971, while fish hygiene issue at markets is looked into by the Health Department. However, the frequency of quality inspection in the market places is very rare due to manpower shortage. The amended Assam Fisheries Act and the Assam Fish Seed Act and Rules should contain the necessary clauses for governing the fish and fish seed sale within and outside Assam to avoid duplication/overlapping of rules and regulations. The fisheries policy of Assam should incorporate the policy elements governing the fish trade

(e) Farmers in each of the identified villages in the cluster will be mobilised and organised into a Farmer Producer Organization (FPO) and registered under the Societies Act or Companies Act, as the case may be. All the fish farmers/seed farmers in the villages within the cluster having a pond with a water area of 0.15 ha and above will be members of the FPOs. Adequate representation for Women members shall be given in all committee of the FPO. The FPOs will be registered as Farmer Producer Companies (FPCs) after 2 years of formation after achieving comprehensive governance.

228. Eligibility & Selection Criteria

(a) **Production Clusters:** 44 production clusters in 44 development blocks have been identified for project intervention as per the criteria below-

(i) Minimum fish farming water spread area of 50 ha under pond fisheries only, with cluster having beel fisheries or not,

(ii) Average productivity about 2.5-3 t/ha/yr for ponds and tank fisheries,

(iii) Considerable marketable surplus and have influence on market landings,

(iv) Regular flow of marketable surplus fish from cluster to market(s),

(v) Cluster may have seed production activities or may not have,

(vi) Should have road connectivity,

(vii) Coverage of villages for formation of Farmers Producer Organization may be ten.

(viii) Area of individual beel fisheries may be in the range of 7-100 ha,

(ix) Beels may be registered/ un-registered, registered beels leased to co-operative societies, un-registered beels under community management with members residing within 2 km from beel periphery, or un-registered beel lying un-utilized, beels partially registered and partially owned by community with members residing within 2 km from beel periphery. In case of beels under community ownership, either partially or fully, no individual member of the community should possess ownership of more than 10% of beel water area.

For FPOs: Each fishery FPO will be formed in those clusters where constituent farmers are having minimum 400 ha of gross water area ponds/tanks. This water area is expected to generate considerable marketable surplus to support sustainable and sound business through ***Common Service Centre (CSC)***, to be established one under each FPO. Eleven (11) such FEOs will be formed under the project each having more than 400 ha of pond water area. However, as the FPO members will cover around 500 farmers or more, for efficient management and proper functioning of the FPOs, smaller groups with membership of 25-50 farmers will be formed in the form of CIGs of AACP. Each FPO will have one CSC. There will be 21 FPOs of which 11 FPOs will be new ones and the 10 FPOs formed under AACP (5 each in the districts of Nagaon and Sonitpur), will be strengthened. While the 11 new FPOs will have one CSC each, 2 CSCs will be in Sonitpur and Nagaon located in selected FPOs, taking the total number of CSCs to13, in 8 project districts each covering 1500 sq. ft.

For FPGs: In rest of the production clusters where farmers' gross pond/tank water area coverage being less than 400 ha and therefore no FPO will be formed, only the ground level smaller farmers groups like the CIGs of AACP under the new nomenclature of *Farmer Producer Groups* (FPGs) will be formed with same number of farmers (25-50) as in case of CIG of FPOs as per new guidelines.

For BDMC: For community development and management of beel fisheries, BDMC (Beel Development and Management Committee) will be formed comprising of one member from each of the families living within 2 km of beel periphery. Formation of different committees for better and efficient management of the common property resources will be in the same line of BDC as formed under AACP.

(b) **Demonstrations:**

(i) **Pond fisheries- Monoculture & Polyculture**

- A farmer should have pond water area of 0.25-1.00 ha,
- The pond should be existing one with no major civil work requirement,
- Preference will be given to those ponds having inlet and outlet,
- Pond ownership with farmer/ one of the parents of the farmer,
- Pond dewatered every year,
- Present productivity should be about 3 t/ha/yr,
- Water retention in ponds throughout year at a minimum level of 4ft,
- Selling fish to market on regular intervals,
- Pond located preferably on road side and easily accessible.

(ii) **Paddy-fish integration**

- The farmer should be a regular paddy-fish farmer,
- The area of the site covering both fish and paddy farming to be in the range of 0.40 to 1.00 ha,
- The site preferably should have access to irrigation facilities,
- The site preferably on road side and easily accessible.

(iii) **Beel Fishery**

- Area of individual beel should be in the range of 7-100 ha,
- Beel should preferably be not flood affected,
- Beel should be perennially water retentive,
- There should not be highly dense weed mass,
- Both closed and open beels will be selected based on topographical advantage for scientific management
- Minimum 5% land area of the beel available for creating seed rearing facilities.

(iv) **Brood Bank Farm (Government fish farms)**

- Farm should not be flood affected,
- Should have minimum 24 ha of water area
- Suitable land area available in the farm for development/ creation of essential infrastructure,
- There should have adequate demand of seed (spawn/fry/fingerling/yearling) in the district/zone.

(v) **Seed Multiplication Centre (Govt. fish farm)**

- Farm should not be flood affected,
- Water area of the farm preferably not below 2 ha,
- Suitable land area available in the farm for development/creation of essential infrastructure,
- There is considerable demand of quality breeder seed in the neighbouring/ zonal districts.

(vi) **Selection criteria for demonstration programmes under Farmer Producer Group (FPG)**: The FPGs will include both individual ponds and community tanks within the specified jurisdiction. Out of all the ponds/tanks identified under each such group, ponds and tanks fulfilling the following criteria will be considered for demonstration under APART-

- Individual ponds ranging from 0.25 ha to 1.0 ha,
- Community tanks ranging from 2.0 to 7.0 ha,
- The pond/tank should be in good physical condition requiring no major earthwork,
- Concerned farmer/ community must have minimum 5 years' experience in fish culture activities,
- The minimum average production achieved during the last 3 years should be 2.5 MT/ha/yr,
- Concerned farmer/ community member must have at least one training (of minimum 1 day duration) on fish culture,
- Concerned farmer/ community must agree to bear the recommended beneficiary share. On initiation of the project they should deposit their respective share in the FPGs account in advance. (This will ensure their financial soundness for commercial production and marketable volume).

229. Activities to be Financed Including Illustrative List of Investment: APART will support activities under 4 (four) major components with overall project development objectives *"to increase value-added and improve resilience in the production and processing of selected agriculture commodities, focusing on*

small farmers and agro-entrepreneurs in targeted districts". Fish' being one of the important commodities under the project, activities for intervention have been identified in tune with the sub-components of the project.

(a) **Facilitating enterprise cluster development: *Micro, Small and Medium Enterprises (MSME) investment support-*** There is considerable market demand for value-added fish products such as fish pickle, fish fingers, fish sauce, packaged dressed fish, fish fillets, dry fish, fermented fish, etc., for which selected NGOs/SHGs/ Co-operative Societies which are presently involved in similar business in small - scale, will be supported with MSME investment to up-scale their activities

(i) *Fish processing-Value Addition:* The women SHGs mostly organized in the districts of Barpeta, Jorhat, Kamrup, Lakhimpur and Nalbari have taken up fish processing for preparation of *fish pickle, fish sauce, dry fish, fermented fish* in special form, etc., and are presently earning considerable amount for maintaining their families. The women groups have shown considerable interest in taking up the aforesaid supplementary livelihood activities, in the recent stakeholders' meet held in the PIU/PCU, on production of value-added fish products. It is, therefore, proposed to provide support to these five groups in the form of common facilities like **(i)** a processing unit to be created preferably in the office campus of the District Fishery Offices of the five districts or, attached to the nearest CSCs and managed by these groups, and **(ii)** minimum equipment/utensils to run their business. A modality will be designed for its efficient management. Two societies are presently involved in preparation of fermented fish ('sidal') in Cachar district and three societies/SHGs are involved in fish drying in Goalpara, Jorhat (Majuli) and Nalbari district and marketing the product within and outside the state. The project proposes to up-scale their activities of production of value-added items to have wider markets in the neighbouring NE states.

It is also proposed to go for production of ready-to-cook *packaged fish* by one FPO in Kamrup district. The processing unit will be set up attached to the CSC of the FPO. The ready-to-cook fish will have considerable markets in big towns in the state and the FPOs can have tie-ups with city malls and departmental stores for marketing of their produce. The unit cost of these **10 units** is estimated to be Rs.15.00 lakh each. 25% of the cost is proposed to be the beneficiaries' share while the balance will be borne by the project. These activities will be taken up under C-2 component. Skill development through training and exposure visit for the entrepreneurs identified under the project in the relevant field will be organized both within and outside the state. For sustaining the production of fishery products by the enterprises, there should be regular flow of raw materials to the units. For enabling the SHGs/NGOs to run the enterprises, an MOU between the SHGs/NGOs and nearest FPO/CSCs of the respective districts will be entered into, so that the FPOs could supply the fish as per requirement of the groups, at the rates fixed and agreed upon by the two parties. For production of ready-to-cook fish, the FPO will arrange fish from their own farm ponds.

(ii) *Flake ice manufacturing unit to FPOs:* The project will extend technical and financial support to the FPOs to maintain quality of fish during transportation to distant markets by providing one mobile flake ice manufacturing unit to each CSC. The unit will be run and managed by the FPO themselves for which the selected members will be adequately trained. The unit cost for each ice unit is Rs.5.00 lakh of which the FPO's share will be 25%.

(iii) *Live fish transportation support to FPOs:* In the present days, consumers' demand is gradually shifting towards fish in live condition. Accordingly, fish transportation system has also evolved. A considerable quantity of locally produced fish is transported in live condition in specially designed plastic bins reinforced with bamboo and iron frames as support and fitted on four-wheelers. About 2.5 to 4 quintals of live/wet fish stocked in these bins containing sufficient quantum of water are

transported to nearby markets. Water in the bins are continuously stirred by two-three persons during transportation. This action causes mortality of fish to the extent of about 20-25% of fish in the container. The project will extend support to the FPOs by providing mechanical devices/ aerators for installing in their live fish transportation vans. This will help the FPOs to transport fish in live condition without mortality and help them get better price. 25% of the unit cost of Rs.0.10 lakh for each such device will be shared by the FPOs. Skill development through training and exposure visit for the entrepreneurs identified under the project in the relevant field will be organized both within and outside the state. Skill development through training and exposure visit for the entrepreneurs identified under the project in the relevant field will be organized both within and outside the state. Fish feed is an essential input for enhancement of productivity. The present level of annual production of fish feed in the state is a meagre 4000 tonnes (approximately) against the minimum requirement of over 90000 tonnes. This is a major constraint in productivity enhancement in culture fisheries in the state. To mitigate the binding constraint, project will encourage establishment of zonal feed plant of standard capacity under private sector.

(b) **Connectivity to the Clusters:** Road connectivity to and within the clusters will be covered by the PWRD under sub-component B2.1.

(c) **Market support:** Development/ reconstruction of already existing fish markets/seed markets linked to fish and fish seed clusters have been proposed under the project. The present condition of the infrastructure in the identified markets is in very bad shape with no drainage, they are highly congested, with poor or no water provision, many are without power connection and some are even functioning under open places. The existing markets are presently under the ownership of Municipality, Zila Parisads, Gram Panchayats and a few are under private ownership. The project has identified 25 markets for development which are owned by P&RD Department. Adequate modalities will be designed for efficient management of the available infrastructure after project intervention.

(i) *Training of wholesalers, retailers and aggregators, panchayat representatives:* Capacity building on post-harvest management is very important to maintain quality of fish till it is sold in the retail market. Each value chain player right from fish harvest generally arranged by aggregators and transported by him to markets, and subsequently handled by wholesalers and retailers require minimum training on post-harvest handling of fish. Project will arrange 1-2 days training to these intermediaries on quality maintenance of fish at each stage of fish handling. Further, as large numbers of markets are under the ownership of Panchayats/ Zila Parishads, they are responsible for hygienic maintenance of markets. Hence, they need to be made aware of how markets are better managed.

(ii) *Improvement of price discovery methods*: The present system of pricing is not very effective as farmers actually remain in dark about what price they may get after sending the fish to the market. Sometimes it so happens that heavy loss is incurred by the farmers due to sudden excess market landings as there is no effective system of communication or harvesting schedule amongst the producers. Proper coordination amongst the producer groups with solid marketwise harvesting schedule will help them get better price and a say in pricing of fish in the market. However, it is essential that there is a sound market intelligence network so that all concerned actors are directly linked to the system for coordinated marketing with reasonable pricing of the produce

(iii) *Unit cost for fish market development*: Altogether 20 Fish markets will be developed under this project. Tentatively, following facilities are considered to be provided in these fish markets.

Sl.	Particulars	Approx total area/capacity	Unit rate	Total (Rs. Lakhs)
1	Closed auction platform with shed	4500 sq. ft	Rs. 1600/ sq.ft	72.00
2	Retailer sheds (25 sheds, each 180 sq.ft.)	4500sq.ft	Rs. 800/ sq.ft	36.00
3	Drinking water facility (With DTW)	1	Lumps sum	3.50
4	Toilet block (For ladies and gents)	1 unit	Rs. 475000/unit	4.75
5	Market yard improvement by paver block (Over WBM)	2000 sq. ft	Rs. 200/sq. ft	4.00
6	Electronic Weighing Scale	3 nos.	Rs. 15000/- each	0.45
7	Electricity	--	LS	4.00
8	Drainage	--	LS	4.30
9	Electronic Display Board	1	Each	1.00
	Total	**--**	**--**	**130**

(d) **Post Harvest Fisheries Management:** Fish is a highly perishable commodity. To develop cold chain, the project will extend technical and financial support to the FPOs to maintain quality of fish during transportation to distant markets by providing one mobile flake ice manufacturing unit to each CSC. The unit will be run and managed by the FPO themselves for which the selected members will be adequately trained. The unit cost for each ice unit is Rs.5.00 lakh of which the FPO's share will be 25%.In the present days, consumers' demand is gradually shifting towards fish in live condition. The project will therefore extend support to the FPOs by providing mechanical devices/ aerators for installing in their live fish transportation vans. This will help the FPOs to transport fish in live condition without mortality and help them get better price. 25% of the unit cost of Rs.0.30 lakh for each such device will be shared by the FPOs. An appropriate campaign/awareness could be launched to raise awareness and educate all stakeholders/ market players about better handling, hygiene and processing practices using a participatory video approach which could be disseminated along with other sensitization materials.

(e) **Sustainable Production Enhancement Program**

(i) Establishment of seed multiplication centres (4 nos) for quality seed production with genetically improved strains e.g. Indian carps (Jayanti Rohu), Gift tilapia on a zonal basis,

(ii) Establishment of hatcheries (15) with improved Brood Stock management programme for production of high yielding carps in 15 districts,

(iii) Novel polyculture technology demonstration in pond fisheries for market demand based fish species and of size range in 1200 ha. Project will make contributions for these demos to the extent of 80% and beneficiaries will contribute 20%. It will be ensured that beneficiary contribution will be spent first and later project contribution will be spent. The project contribution will be released in two tranches (80% and 20%). The last tranche will be on reimbursements basis.

(iv) Technology demonstration in beel fisheries by combining indigenous small fishes (e.g. mola) with Indian carps, supported with stock enhancement, stock improvement and habitat management/improvement in 2225ha including demonstration of pen culture. Minimum beneficiary contribution will be 20%. It will be ensured that beneficiary contribution will be spent first and later project contribution will be spent. The project contribution will be released in two tranches (80% and 20%). The last tranche will be on reimbursements basis.

(v) Promoting technologies for climate resilience like paddy-cum-fish integration in 500 ha, and

(vi) Capacity building and exposure visits of farmers and awareness programmes.

(f) **Value chain development through Collective entrepreneurial spirit covering**:

(i) Setting up of 13 new Farmer Producers Organizations (FPOs), strengthening of 10 AACP formed FPOs and their operationalisation and establishment of 13 Common Service Centres,

(ii) Development of Cluster specific value chain action plan models, and promoting collective entrepreneurial spirit through procurement of inputs & its delivery, aggregation of fish and marketing of fish as per need,

(iii) Private sector investment for setting up fish feed plants using locally available ingredients,

(iv) Streamlining credit linkage and insurance to support Credit flow from the financial institutions/ insurance coverage to farmers of FPOs.

(v) IEC campaign on demonstration of farming practices for farmers' adoption, food safety issues and against breeding and culture of banned fishes and capture of fish during ban period.

(vi) The village community will be informed about the details of fish farming technology demonstration and the farmers' names in whose farm the demonstration will be held so as to enable the fish farmers to visit and witness the technology being adopted for augmenting the fish productivity, production, post-harvest handling and marketing.

(vii) Simple brochures and hand-outs (in local languages) will be distributed among villagers.

(viii) Training of farmers in 2-3 sessions will be organized to make them learn and assimilate the technology being adopted for fish production and marketing.

(ix) A field day will be organized at the site of demonstration for showcasing the benefits of improved farming practices to fellow farmers. The date of field day may be decided well in advance to give proper publicity for ensuring attendance of large number of farmers on field day.

(x) One Lead Farmer from each group of 10 demo-farmers will be identified on the basis of productivity and water area available. He will be suitably trained to provide extension support services to the farmers of the FPO.

Note: Value chain development plan for fisheries is provided at annex *C.1.5 (a)*

(g) **Studies Proposed:** six studies will be taken up under the Project:

(i) Study on climate resilient technologies to support pond aquaculture,

(ii) Study to better understand fish bio-diversity and conservation value of beels in relation to stock enhancement,

(iii) Suitability analysis study for setting up seed multiplication centres for genetically improved fish strains,

(iv) Detailed fish feed value chain study,

(v) Market Study on consumer preference and consumption pattern

(vi) Study on FISHFED revival, status of co-operatives and marketing,

Out of the six studies as indicated above, five studies at (i) – (v) will be undertaken by WorldFish, Malaysia and the study on FISHFED revival will be undertaken by engaging a consultancy firm.

(h) **Estimated cost:** The total project cost is estimated at Rs. 13104.25 lakh. Out of this amount, project share is Rs. 11340.80 lakh and beneficiary share is Rs.1763.45 lakh. The cost estimate does not include the cost for infrastructure development like roads, markets, supports for value additions activities to CSCs. The summary of cost estimate is furnished below:

Sl	Activity	Project share (Rs. in lakh)	Beneficiary share (Rs. in lakh)	Total cost (Rs. in lakh)
A	Studies and Consultancies	1125.00	0.00	1125.00
B	Market-led Production	8178.80	1763.45	9942.25
C	PIU Cost	2037.00	0.00	2037.00
	Total	**11340.80**	**1763.45**	**13104.25**

230. Institutional and Implementation Arrangements

(a) *The Core PIU* will be located at the Secretariat in the respective Department headed by senior most Secretary of the Department. He will be assisted by one Joint Secretary of the Department. In addition, one Technical Expert (Fishery), will be provided as support staff.

(b) *The Operational PIU* headed by the Director of Fisheries (DF), Assam will function from Meen Bhawan, Guwahati. A senior officer of the Department will be notified as Nodal Officer (NO) and another officer will be notified as Alternate Nodal Officer (ANO). A junior ranked officer as Assistant Project Officer will support these officers. All the three officers will work under the direct control of the DF. Further, the Government will notify one Fishery Coordinator for placement at the PCU in ARIAS Society for coordinating with CPIU/OPIU and field level functionaries. The OPIU will be manned by requisite support staff. In addition, following contractual staff will be procured for the OPIU.

Sl	Post	No
1	Accounts Officer	1
2	Marketing Expert	1
3	Engineering Consultant	1
4	Data Entry Operator	1
	Total	4

(c) *At district level,* APART activities will be implemented by District Fisheries Development Officers (DFDO) through ATMA with the support from Director of Fisheries. He will be assisted by a team of staff, as indicated below, who will be procured under the project. The District level team will comprise the following;

Sl	Post	No
1	Technical Expert (Fishery)	1
2	Engineering Consultant	1
3	**TOTAL**	**2**

231. Results Chain and Results Framework

(a) **Results Chain:**

Sl	Activities	Sub-Activities	Output	Outcome
1	Technical assistance for implementing POPs, inputs for demonstration models	Studies on climate resilient technologies to support pond aquaculture, Fine tuning of POPs, promoting climate resilient technologies, promoting integrated aquaculture practices like paddy-cum-fish farming, training programs, extension support to all clusters, demonstration of carp-mola polyculture technology, monitoring and documenting crop performance, farmer field days, exposure visits	Adoption of refined and updated POP for semi-intensive carp and mola culture in tanks and ponds for increased productivity and production of 5-6 tonnes/ha/yr.	Increased productivity, increased availability of fish in markets, increased income. Improved per-capita fish consumption, improved livelihoods of farmers, Technology adoption by 80% farmers.
2	Technical assistance, inputs for demonstration of beel models	Studies to better understand biodiversity and conservation value of beels in relation to stock enhancement programs, Fine tuning of POPs, training programs, extension support to all clusters, monitoring and documenting crop performance	Adoption of better fisheries management in beels for augmenting fish productivity and production and conservation of biodiversity of aquatic organisms in beels.	Increase in productivity of fish in beel fisheries. Increased availability of diverse range of fishes from well managed beel clusters. Improved governance and management of beels, conservation of diversity, better utilization of natural resources
3	Developing genetically	Suitability analysis study for setting	Setting up of 4 Multiplication	Availability of genetically improved

Sl	Activities	Sub-Activities	Output	Outcome
	improved broodstock for setting up multiplication center (MC), technical assistance for setting up and operating MC, funds,	up of MC for genetically improved fish strains, POP for setting up and running of MC, capacity building of MC operators, dissemination strategy for genetically improved seed, monitoring the performance and impact of improved strains	Centres for genetically improved fish strains, based on the standardised PoPs developed.	seed in sufficient numbers, availability of certified seed. Increased fish production, Increased demand for genetically improved fish seed, Increased income to farmers,
4	Sourcing of new broodstock from rivers and ponds, funds, technical assistance for setting up scientific broodstock management program (reduce in-breeding)	POPs for setting up and running improved broodstock management program, capacity building activities, developing and implementing seed certification programs	Setting up of 15 fish hatcheries with improved broodstock management programme.	Availability of certified quality fish seed. Improved fish production, Improved income to hatchery operators and farmers.
5	Technical assistance for feed value chain study, funds, investment from private sector	Detailed feed value chain study, investment workshops to highlight the business opportunity,	Setting up of formulated fish feed plants in the state.	Availability of quality fish feed. Improved fish production.
6	Market studies on consumer preferences and household fish consumption patterns , technical assistance, funds	Awareness programs for producers and consumers, POPs for marketing small sized fish in live condition, POPs for culture and marketing of nutrient dense fish,	New fish marketing opportunities (e.g. small indigenous fish, small carps in live condition)	Availability of small sized fish in live condition and nutrient dense small fish in markets increased. Consumer satisfaction on quality and nutritional value, higher income for producers. Increased employment in the value chain

(b) Results Framework

PDO indicators	Unit	Baseline	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	End Target
Improved resilience										
Climate resilient aquaculture practices										
Beneficiaries	Nos.(cum)	0	0	750	1950	3450	4350	5100	5100	5100
Water area (Project target)	ha	0	0	250	650	1150	1450	1700	1700	1700
Adoption farmers	%	0	0	0	60%	65%	70%	72%	75%	80%
Total farmers		**0**	**0**	750	1950	3450	4350	5100	5100	5100
Total area	**ha**	**0**	**0**	250	650	1150	1450	1700	1700	1700
% women	%	0	0	30 %	30%	30%	30%	30%	30%	30%
Technology demonstration in beel fisheries combining small indigenous fishes										
Beneficiaries	Nos	**0**	**0**	**1250**	**4250**	**9250**	**16250**	**22250**	**22250**	**22250**
Water area (Project target)	ha	0	0	125	425	925	1625	2225	2225	2225
% women	%	0	0	30 %	30 %	30 %	30 %	30 %	30 %	30 %
Agri enterprises established										
Fish processing & value addition	Nos. of units (cum)	0	0	5	9	10	10	10	10	10
Jobs created by targeted agrienterprises (incl. women)										
Beneficiaries	Nos. (cum)	**0**	**0**	**70**	**235**	**255**	**255**	**255**	**255**	**255**
% women	%	0%	0%	70%	32%	29%	29%	29%	29%	Av. 35%
Increased value of farm gate marketable output										
Climate resilient aquaculture practices										
From Project area	ton/yr			1225	3125	5225	6625	7850	7850	7850
	Rs. in lakh/ton	1.50	1.50	1.55	1.65	1.80	2.00	2.20	2.35	2.35
Total value	(Rs. in lakh)			1899	5156	9405	13250	17270	18448	18448
Technology demonstration in beel fisheries combining small indigenous fishes	ton/yr	0	0	250	850	1850	3250	4450	4450	4450
	Rs. in lakh/ton	1.50	1.50	1.55	1.65	1.80	2.00	2.20	2.35	2.35
Total value	(Rs. in lakh)			388	1403	3330	6500	9790	10458	10458
TOTAL BENEFICIARIES (Direct + adoption farmers)	**No**			**2000**	**6200**	**12700**	**20600**	**27350**	**27350**	**27350**
TOTAL PRODUCTION	**Tonnes**			**1475**	**3975**	**7075**	**9875**	**12300**	**12300**	**12300**
TOTAL VALUE	**Rs. in lakh**			**2286**	**6559**	**12735**	**19750**	**27060**	**28905**	**28905**

Sub-Component C1.6: Sericulture and Handloom Value Chain

232. Sericulture & Handloom Value Chain: will focus on end to end interventions to strengthen sericulture in Assam. The planned interventions will be implemented by the ATMAs, and Department of Handloom and Textiles (including Sericulture directorate) in collaboration with Central Silk Board, Central Eri and Muga Research and Training Institute, Assam Agricultural University, North East Institute of Science and Technology, National Institute of Design, National Institute of Fashion Technology, Indian Institute of Technology, and other research, academic and private institutions. The *seed to raw silk* part of the value chain will target about 16,000 producers and the *raw silk to fabric* part of the value chain will target about 10,000 weavers. The major interventions planned are: (i) organizing producers into producer groups, (ii) supporting cluster level infrastructure such as community *jali* houses, nurseries, cocoon houses, rearing houses, cocoon drying chambers, grainage houses, and weaver workspace for collective actions; (iii) technical assistance for improved skill and design development, (iv) facilitating technology upgradation and access to finance for the value chain stakeholders; and (v) upgrading existing marketing outlets, developing market channels, and launching branding campaigns.

233. Assam has the oldest tradition of rearing, reeling, spinning and weaving of silk of all varieties viz. Mulberry, Muga and Eri. It is observed that mulberry sericulture has certain inherent limitations in Assam, towards production of quality cocoons & yarn, as in spite of various attempts to bring improvement in quality production, only marginal success could be achieved so far which has hardly any significant implications on the state's economy. The major challenges faced by Assam's silk industry that this project aims to address are as follows :

- Lack of systematic and quality food plantations and limited availability of certified disease free seeds
- Absence of extension service for commercialization due to climate change.
- Limited standardization and innovation at every level i.e., starting from seed supply to fabric production.
- Poor roll out and credit lines for absorption of technology – Rearers, Reelers
- Unorganised market; weak supply chain of raw materials
- Limited product range - the products are highly region specific
- Absence of cocoon drying/storage facilities with reeling/weaving units; need to store/ hold in stock cocoons in sufficient quantities at least for six months
- Requires key investments for raw material and storage facilities.
- Absence of tailored credit to the silk sector.
- Absence of market orientation and lack of awareness about organised trade.

234. Overview of the Sub-component: The focus of this sub component is will focus on end to end interventions to strengthen sericulture in Assam.

(a) The broad objectives **Sericulture Value Chain** include:(i) increase production of raw silk, (ii) increase area under plantation, (iii) increase cocoon yield and reeling efficiency, and quality of silk; and (iv)increase incomes of producer-entrepreneurs and create employment opportunities across the value chain. The major investments will be in (i) organizing producer-entrepreneurs into Producer Groups and Farmer Producer Organization; (ii) establishing community-run Common Services Center (CSCs) to facilitate collective actions and provide extension services and handholding support (iii) creating cluster level infrastructure such as community jali houses, nurseries, cocoon houses, eri rearing houses, cocoon drying chambers, grainage houses, and (iv) providing support though technical assistance and financial intervention packages that facilitate creation of productive assets by farmers .

(b) The broad objectives of **Handloom Value Chain** are - (i) increase production of hand-woven silk, and (ii) increase visibility of Assam's silk brands and expand presence in national and overseas markets. The major investments are in (i) organizing weaver-entrepreneurs into Producer Groups (PGs) and Farmer Producer Organization, and providing them skill and design development support (ii) developing demonstration units for propagating new technologies at the field level, (iii) working with EDPF (Enterprise Development and Promotion Facility) to provide business development support to entrepreneurs (both existing and start up) in the silk value chain (iv) upgrading existing marketing outlets [Assam Apex Weavers & Artisans Co-operative Federation Ltd. (ARTFED) and Assam Government Marketing Corporation Ltd. (AGMC)] and developing market channels and launching branding campaign

235. Target districts and number of beneficiaries: The following five districts have been prioritized on the basis of plantation area, Nos. of rearers, reelers, spinners and weavers, production of raw silk and silk fabrics in the districts. Total 17,000 beneficiaries (10,000 in Sericulture sector and 7000 in handloom sector) will be covered under the project-

District	Clusters					Producer Groups					House Holds (HHs)				
	Sericulture			Handloom	Total	Sericulture			Handloom	Total	Sericulture			Handloom	Total
	Eri	Muga	Total			Eri	Muga	Total			Eri	Muga	Total		
Lakhimpur	2	3	5	6	11	42	41	83	60	143	840	820	1660	1200	2860
Kamrup	3	1	4	8	12	48	70	118	80	198	965	335	1300	1600	2900
Sibsagar	3	4	7	8	15	31	86	117	80	197	615	1725	2340	1600	3940
Jorhat	7	3	10	8	18	130	35	165	80	245	2600	700	3300	1600	4900
Sonitpur	4	0	4	5	9	70	0	70	50	120	1400	0	1400	1000	2400
Total	**19**	**11**	**30**	**35**	**65**	**321**	**232**	**553**	**350**	**903**	**6420**	**3580**	**10000**	**7000**	**17000**

236. Implementation Approach: The following are the key elements of the implementation approach:

(a) **Cluster / spatial approach**: In line with the overall approach of the APART project, the component will adopt clustering as the means to development, and invest in institutions and interventions that enable and promote joint action by cluster actors to realize economies of scale and scope. The component will simultaneously empower entrepreneurs, enterprises and actors in complementary, allied and ancillary sectors and encourage sharing of best practices and innovative ideas. The objective is to create an ecosystem that attracts more entrepreneurs, enterprises, community organizations, and jobs, thereby creating a self-reinforcing cycle.

(b) **Producer / Artisan as entrepreneur**: The producer or the artisan as an entrepreneur is at the centre of this component. The component will encourage the producer / artisan to approach their trade as a business and provide 360 degree support in the form of skill building, finance, knowledge resources, expert advice, technology, design and fashion intelligence, and market linkages to help the producer / artisan grow their business.

(c) **Community-driven development model**: The component will emphasize the creation of cluster assets and facilities that can be owned and managed by community institutions such as Producer Companies. The aim is to facilitate clusters/ producer companies/ consortiums control over planning decisions and resources at the local level, while making available access to know-how and handholding support to increase local capacity.

(d) **End-to-end interventions**: The component will make interventions at every stage of the silk value chain, from silkworm seed production for creation of a panoply of handloom woven silk products, with equal emphasis on addressing supply-side and demand-side gaps.

(e) **Social inclusion**: Particular emphasis will be on creating menu of investments that target income increases for the target population including women & indigenous people.

(f) **Youth empowerment**: Rural youth is one of the key target demographic segments of the project. The component will invest in skilling, capacity building and handholding support in the form of finance, market linkages and mentorship to youth entrepreneurs.

(g) **Public-private-community ecosystem**: The component will place specific emphasis on proactively seeking and building strategic partnerships with the private sector and other stakeholders such as academic institutions, research organizations, technical institutions, apparel and fashion institutions, financial institutions and civil society. The project will engage with these institutions in order to create an ecosystem that fosters entrepreneurial growth and accelerates job creation at the local level, and helps mainstream key lessons into the overall development agenda. Targeted efforts will also be made to proactively involve industry champions to provide mentoring and handholding support to entrepreneurs, enterprises and producer organizations.

237. Sector Strategy: The salient aspects of the sector strategy are as follows:

(a) **Focus on Assam's strengths**: Of the four varieties of silk produced in India (Mulberry, Tasar, Eri, Muga), the component will focus on two varieties that are the strengths of Assam - Eri and Muga. Assam's climatic conditions are particularly suited to the production of these two varieties.

(b) Expand export markets and untapped national markets with sophisticated branding and marketing: Traditionally, Muga silk production has been endemic to Assam and its products have been popular among the Assamese. Majority of sales of Muga products are realized in the markets of Assam and the neighbouring states. Eri, on the other hand, is produced in several states such as Assam, Bihar, Meghalaya, Manipur, Arunachal Pradesh, Karnataka, Odessa, Andhra Pradesh among others, and sells in several markets across the country. While exports of both these varieties are limited, there is rising demand and interest for these varieties in countries such as Japan, US, Europe and West Asia. The component will aim to advertise the brand values of Muga (the 'golden' thread) and Eri (the 'non-violent' 'virgin silk' thread) in these markets and create export linkages. The component will also aim to tap demand in blue ocean national markets with a sophisticated branding campaign.

(c) **Eliminate infrastructure bottlenecks**: The component will invest in community infrastructure such as community jali houses, nurseries, cocoon houses, reeling sheds, weaving work sheds (individual and group) among others at the cluster level in order to eliminate production bottlenecks and provide support to reduce losses, improve yield and scale up production.

(d) **Focus on quality, productivity, cost-efficiency and collectivism**: The component will invest in Common Services Centres (CSCs) at the cluster or sub-cluster level that will facilitate collective efficiencies, knowledge / technology transfer, information dissemination, linkages to schemes, resulting in reduction of production of costs and improved yield. Special emphasis will be laid on improving the grade of the produced raw silk as well as finished products in line with the marketing strategy of increasing exposure to export markets.

(e) **Focus on modern technology and extension services**: The component will pilot and scale up application of modern technologies and innovations in target clusters in partnership with technical and academic institutions (such as Assam Agricultural University) and private agencies. These pilots will then be offered as extension services across a wider target area through the network of CSCs. For enhancement of production of silk fabrics, high productive sectional warping mechanism, high yielding improved looms, mechanised/computerised designing equipment, sophisticated apparel and garment manufacturing facilities, standardised quality control facilities, specialised finishing and packaging will be introduced as per guidance of Indian Institute of Packaging (IIP), NIFT, NID etc.

(f) **Promote entrepreneurship through customized financial products and handholding support**: The component will aim to provide the necessary incubatory support to producers and weavers to help them grow their enterprises. Key to this is facilitating finance and market linkages. The component will develop customized financial products based on the varying needs of seed entrepreneurs, silk producer entrepreneurs and silk weavers. Details are covered in Sub-comp C-3.

(g) Plantation/intercropping Strategy The project will support the maintenance of existing plantation of Government firm/Centre/VGR and in Private Sectors. These options include intercropping with the newly raised plantation with Eri Food plants as well as Som/Sualu food plants for Muga so that returns from the investments can be seen after one year. In case of Eri -Kesserue Plants can be intercropped with Castor and Tapioca with the Muga Som Plants. Since, the production cycle for both, Castor and Tapioca is short (six months), rearing can be explored with the farmers taken up and production of cocoon will be come after one month of rearing. This can be repeated for a couple of years.

238. Implementation Arrangements: The Department of Handloom, Textile and Sericulture will work with ATMA to plan and implement the interventions.

(a) The establishment of CSCs will follow the implementation cycle. The implementation is divided into year-wise activities-

Phase	Description
{Pre –Launch and before launching Sericulture related activities}	Scoping studies and mapping, baseline survey, diagnostic studies and preliminary studies (Section 10) to be undertaken. Project management actions to be undertaken. District level value chain action plans to be developed. Partnerships with research and technical institutions to be developed, and MoUs to be inked. Infrastructure plans to be developed. Entrepreneur models for nursery & seed producers shall be prepared.
Year 1 (Year 2017-18)	**Stage I:** Social mobilization to be launched in Kamrup & Jorhat district for 16 clusters. 160 weavers PGs to be formed. Establishment of 8 nurseries of 1 lakh saplings each for Eri & Muga. Seed multiplication facilities for 2 numbers of Muga farms, 30 nos. seed reares and 10 private seed graineurs. Infrastructure development initiated for 20 Jali house, 150 Eri rearing houses including equipment support (individually/entrepreneur owned), 12 cocoon storage house, 4 cocoon drying chambers, distribution of 50 Eri spinning machine,skill up-gradation for 180 nos. of reelers and spinners. IEC campaign (Seri) started for 16 programmes in 2 project districts. Infrastructural activities initiated for 5 Handloom CSCs. Financial intervention package (through community contribution, convergence, banks and ABDF) developed for agro-entrepreneurs in the sapling and seed development, Financing package developed for estimated 1800 upgraded/new looms. Skill mapping and training for weavers in design/product development initiated. Skill up gradation programme initiated for 100 departmental staffs and IEC campaign (Handloom) started for 25 programmes in 2 project districts.
Year 2 (Year 2018-19)	**Stage II: A**ctivities initiated for 1st yr districts and Stage I activities initiated for Sonitpur & Lakhimpur for 11 clusters, 110 weavers PGs formed. Establishment of 8 nurseries of 1 lakh saplings each for Eri & Muga, 560 ha.. Seed multiplication facilities for 2 numbers of Muga farms, 40 nos. seed reares and 10 private seed graineurs.Infrastructure development initiated for 30 Jali houses, 150 Eri rearing houses including equipment support (individually/entrepreneur owned), 5 cocoon storage house, 4 cocoon drying chambers, distribution of 70 Eri spinning/Muga reeling machine, 1 reshom haat, skill up-gradation for 180 nos. of reelers and spinners. Exposure visit for 20 nos. and 1 Workshop. Training for 20 numbers of Departmental Staff for skill upgradation. IEC campaign (Seri) started for 16

Phase	Description
	programmes in 2 project districts. Infrastructural activities to be continued for 5 CSCs. Skill mapping and training for weavers in design/product development initiated in the new districts. Skill up gradation programme initiated for 100 departmental staffs and IEC campaign (Handloom) started for 25 programmes in 2 project districts. Exposure visits for technical staff (10 nos.) and Weavers (25 nos) initiated. State level work shop for cross learning for 100 nos. has been initiated.
Year 3 (Year 2019-20)	**Stage III**: Activities initiated for 1st yr districts and Stage II activities initiated for 2nd yr districts and Stage I activities initiated for Sibsagar districts. Establishment of 700 ha. Food plantation at CIG level. Seed multiplication facilities for 50 nos. seed reares and 10 private seed graineurs. Infrastructure development initiated for 30 Jali house, 250 Eri rearing houses including equipment support. (individually/entrepreneur owned), 5 cocoon storage house, 4 cocoon drying chambers, distribution of 80 Eri spinning/Muga reeling machine, 1 reshom haat, skill up-gradation for 180 nos. of reelers and spinners. Training for 20 numbers of Departmental Staff for skill upgradation. Exposure visit
	for 20 nos. and 1 Workshop. IEC campaign (Seri) started for 16 programmes. Training for PG/PCs in marketing, financial management and community procurement initiated. IEC campaign (Handloom) started for 25 programmes. For districts of 1st yr the following activities will be initiated: 1. Development of business plans for the 5 Producer Companies. 2. Formation and registration of 5 Producer company completed. 3. Financial intervention package (through community contribution, convergence, banks and ABDF) developed for 600 looms, 300 jacquards and 800 looms accessories for the first year districts. Transfer of all infrastructural assets to Cluster level institutions. 4. Prototype development for new designs and products 5. Financial intervention package (through community contribution, convergence, banks and ABDF) developed for 600 looms, 300 jacquards and 800 looms accessories. 50 nos of Skill mapping and training for weavers in weaving/design/product development initiated. Exposure visits for technical staff (10 nos.) and Weavers (25 nos) initiated. State level workshop for cross learning for 100 nos. has been initiated.
Year 4 (Year 2020-2021)	**Stage IV**: Activities initiated for 1st yr districts and Stage III activities initiated for 2nd yr districts and Stage II activities initiated for 3rd yr districts. Seed multiplication facilities for 50 nos. seed reares and 10 private seed graineurs. Infrastructure development initiated for 30 community Jali houses, 5 cocoon storage houses, 4 cocoon drying chambers, 250 Eri rearing Houses and distribution of 90 reeling and spinning machines, 1 no. reshom haat, skill upgradation training programme in post cocoon for 180 nos., Training for 10 numbers of Departmental Staff for skill upgradation, exposure visit for 20 nos. of farmers and 1 workshop. 3 Producer companies formation supported for 5 project districts. Transfer of all infrastructural assets to Cluster level institutions. "Hand-woven in Assam" branding campaign and Marketing activities initiated. Financial package developed 600 upgraded/new looms, 300 jacquards and 800 looms accessories. 25 nos. Skill mapping and training for weavers in weaving/ design/product development initiated. State level work shop for cross learning for 100 nos. has been initiated.

Phase	Description
	Infrastructural up-gradation activities initiated for marketing partners (ARTFED, AGMC and others) initiated. Exposure visits for technical staff (10 nos.) and Weavers (25 nos) initiated. Marketing and branding activities initiated.
Year 5 (Year 2021-2022)	Seed multiplication facilities to 60 seed rearers, 17 private grainures. Infrastructure development initiated for 40 Jali houses, 6 cocoon storage, distribution of 100 reeling and spinning machines and establishment of one Resham Haat. Skill upgradation training programme to 180 nos. reelers and spinniers initiated in post cocoon sector. Exposure visit of 20 nos. of farmers and 1 workshop. Financial package developed 600 upgraded/new looms, 300 jacquards and 800 looms accessories 40 nos. Skill mapping and training for weavers in weaving, design/product development initiated. State level work shop for cross learning for 100 nos. has been initiated. Marketing and branding activities including trade fairs (1), buyer seller meets (3) undertaken. Infrastructural up-gradation activities initiated for marketing partners (ARTFED, AGMC and others) completed. Exposure visits for technical staff (10 nos.) and Weavers (25 nos) initiated. State level work shop for cross learning for 100 nos. has been initiated..
Year 6 (Year 2023-2024)	Seed multiplication facilities to 70 seed rearers, 20 private grainures. Infrastructure development initiated for 6 cocoon storage, distribution of 110 reeling and spinning machines. Establishment of 1 reshom haat, Exposurer visit of 20 nos. of farmers and conducting one workshop on cocoon marketing. Marketing and branding activities including trade fairs (1), buyer seller meets (3) undertaken. State level work shop for cross learning for 100 nos. has been initiated.
Year 7 (Year 2024-2025)	Seed multiplication facilities to 30 private grainures. Infrastructure development initiated for 6 cocoon storage house, distribution of 20 Muga reeling machines. Exposure visit of 20 nos. of farmers. Marketing and branding activities including trade fairs (1), buyer seller meets (3) undertaken. State level work shop for cross learning for 100 nos. has been initiated

(b) **Proposed Studies:** The following studies are proposed to be undertaken to improve effectiveness of proposed interventions.

Sl	Topic
1	Feasibility of an entrepreneurship based model in seed production and seed certification in Assam
2	Feasibility of an entrepreneurship based model in silk food plantation through vegetative nuerseries in Assam
3	Threats to Assam's silkworm industry from diseases, and key solutions to manage them.
4	Assessment of the markets - market players, market size and growth trends of Eri and Muga (Expected to be addressed in the value chain analysis proposed under activities)
5	Diagnostic study on weaver's need assessment

239. Summary of Cost: Estimate of tentative cost is provided in the table below. Details are available in the cost table.

Particulars	Total
A. Studies and consultancies	60
B. Service Provider Costs	48
C. Support to Plantation for Silk Production.	42
D. Cocoon Production	156
E. Commercial Seed production	479

Particulars	Total
F. Commercial cocoon rearing	1204
G. Silk reeling & spinning	104
H. Cocoon & Silk Marketing	592
I. Training and capacity building/support service	70
J. Support to OPIU	257
K. Support to District Offices	152
L Silk Handloom	2280
Total	**5444**

240. Risks and Mitigation Measures

Risk	Mitigation Measures
Low production, productivity and quality leaf	Adoption of Package & Practise in existing plantation emphasizing on organic manure
Non- Systematic Plantation	Increasing plantation with systematic planting and intercropping.
High yielding genotype variety	Raising & Supply of Genotype variety of planting materials with drought and flood resistance variety.
Hatching failure & production irregularities	(a) Selection/identification of suitable zone for seed crop rearing for future multiplication to commercial seed. (b) Adoption of separate seed cocoon growers with support for maintain plantation and improve nuclear farm rearing techniques for p2 and p1 seed crop rearing.
	(c) Ensuring strict adoption of seed crops rearing technology develops from each pre -seed and seed crops future research to be conducted for 100% hatching and fertility by Central Eri & Muga Research Station, Ladoigorh, Jorhat, AAU Jorhat & NEIST, Jorhat.
Poor seed cocoon storing facilities.	(a) Provision for seed cocoon preservation facility with regulated temperature and humidity. (b) Ensure microscopic examination for disease freeness and disinfection of eggs for which seed inspection unit/certifying agencies may be created by involving private participation. (c) Proper packaging and transportation of eggs particularly under suitable temperature and humid condition. (d) Proper incubation of eggs. (e) Incurring for capacity of Eri Muga and Mulberry rearing from present level (50-60) to 100-120 DFLs pre-crop by providing rearing house and equipment.
Lack of efficient Cocoon transport system	Suitable arrangements for timely transportation of both seed and commercial cocoons.
Use of primitive method for cocoon seed stifling, sun drying etc.	(a) Introduce standard method of cocoon stifling for longer storage and recovery of better quality silk. (b) Develop common facility centre for cocoon boiling, de-gunning.
Low production with traditional machines/ Charkhas with improper twist	Introduction of improved machines developed by Central Silk Board for increasing production, productivity & quality.
Non adoption of upgraded technology	Training on upgraded technology at various level will be imparted to the beneficiaries.
Losses of Products & machines due to natural calamities/ such as drought/ Flood/ hail storm	Insurances Component.
Lack of Farmers share	Proper & efficient selection of farmers
Fluctuation of Price of Cocoon / Silk	Linkage with KCC.
	Adoption of Silks policy & regularity market by Govt.
Default on the user fee for facilities in the common service centre like huts, community house etc.	Groups of farmers will be register and constant pressure will be a major factor driving timely payment of use fee.
Present marketing of cocoon yarn etc. are not regulated for which grassroots farmers the actual benefit of their product.	For regular marketing of the product cluster base market like cocoon Bank market seed to be develop so that the farmers can get the actual value for their product at doorsteps.

241. Results Chain and Results Framework:

(a) Results Chain:

Component	Activities	Sub Activities	Output	Outcome
Sericulture	Institutional building activities	Creation and strengthening of producer groups (PGs)	Improved ability to undertake collective actions, access capital and information. Reduced transaction costs	Increased production of raw silk Improved efficiency, yield
		Federating PGs into Producer Companies (PCs)		
		Establishing Common	Increased access to extension	

Component	Activities	Sub Activities	Output	Outcome
		Services Centers and training PCs to manage them	services, know-how, finance, markets and handholding support	and quality at each stage of silk production
	Motivational cum capacity building programmes for producers (rearers / reelers / spinners)	Knowledge gap analysis of the stakeholders	Transformation of home based sericulture activities to commercial sericulture activities through cluster based approach	Improved competitiveness of Assam's sericulture value chain
		Awareness campaign and distribution of awareness materials	Increased technical knowhow of modern sericulture processes	
		Demonstration sessions and workshops		
	Enhancing silkworm seeds preparation, distribution and Cocoons Collection Systems	Organize and support local Adopted Seeds Rearers	Systematic and simple way of silkworm seeds procurement & distribution amongst the Rearers in time	Increased employment opportunities
		Organize and support local Adopted Seeds Graineurs	Improved quality of Seeds delivered system as per prescribed methods	
			Improve coordination amongst the seeds Rearers, Graineurs, Cocoon producers & Reelers/ Spinners, etc.	
	Augmentation of silkworm food plants	Facilitating nursery raising activities	Increased area under plantation and leaf yield	
		Facilitating systematic plantation	Increased food plantation and leaf yield	
		Timely provision of inputs (seeds / fertilizers / manure), irrigation facilities	Increased yield per hectare	
		Technological support and access to know-how on modern techniques and timely maintenance	Increased area under plantation and leaf yield	
	Enhancing systems for processing of yarn & raw silk	Setting up of yarn and raw silk processing units with modern machinery and equipment	Increased raw silk / yarn processing capacities	
		Provide training to Reelers/ Spinners through technical experts to maintain uniform quality of yarn	Improved quality of silk / yarn, and increased margins	
	Developing sericulture infrastructure assets at community level, and providing equipment (across value chain)	Setting up nurseries	Increased area under plantation and leaf yield	
		Setting up grainage houses	Improved production of high quality seeds	
		Setting up cocoon drying chambers and cocoon storage houses	Improved cocoon yield	
		Setting up Eri rearing sheds	Improved cocoon yield	
		Setting up community jali houses	Reduced silkworm losses	
		Setting up resting sheds	Improved workplace conditions for producers to increase productivity	
		Setting up reshom haats	Direct linkages between silk producers and buyers, resulting in increased margins	
		Provision of equipment such as reeling machines, Eri spinning machines, cocoon opening machines etc.	Improved reeling/spinning efficiency, improved cocoon yield	
	Financial intervention with ABDPF for development of financial menu options that are lucrative/attractive to	developing financial menu options to finance micro-business plans, equipment investments, working capital requirements by	Improved adoption of modern silk production practices, improved margins, reduced dependence on local moneylenders / middlemen, improved ecosystem for	

Component	Activities	Sub Activities	Output	Outcome
	entrepreneurs across the value chain	agro entrepreneurs and entrepreneurs	entrepreneurship	
Handloom	Skill, design and product development	Skill and design development workshops for weavers	Development of fresh, contemporary prototypes leading to more marketable products	
		Provision of upgraded / new looms and accessories	Improved weaving productivity and efficiency	
		Setting up of urban handloom village with design input center	Generation of innovative designs based on market intelligence and contemporary trends. Increased tourism potential	
	Creating marketing channels and launching branding campaigns	Setting up of handloom marketing complex at Guwahati	Increased sales, resulting in increased weaver / producer incomes	
		Developing of marketing channels (national and international)	Increased sales, resulting in increased weaver / producer incomes	
		Facilitating trade fairs and exhibitions	Exposure to markets. Development of buyer-seller linkages. Increased sales	
		Mass branding campaign	Dissemination of brand values of Assam's silk products, resulting in new linkages and expansion of markets	
	Development of MIS	Creation of cluster-wise weaver database, and a mobile-cum-web interface to mine data. Regular maintenance of the MIS	Generation of cluster wise data, leading to insights that result in greater program efficiencies and impact	

(b) **Results Framework:**

SERICULTURE								
Indicator Name	**Baseline**	**Cumulative Target Values**						
		YR1	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**YR7 EoP**
(Eri)								
Nursery Requirement (in nos)		500000	10,00000	10,00000	10,00000	10,00000	10,00000	10,00,000
Plantation Requirement (in Ha)			400	800	800	800	800	800
Cocoon production (M.T)	387	387	427	467	507	547	586	586
Raw Silk production (M.T)	299	299	330	360	390	420	451	451
Number of Farmers to be involved for plantation (in nos)			500	1000	1500	2000	2000	**2000**
Graneure to be involved (in nos)		50	100	150	200	250	300	352
Adopted seed rearers to be involved (in nos)		12	24	36	48	60	72	88
Commercial rearers to be involved(in Nos)		600	1200	1800	2400	3000	3600	4283
Spinners to be involved (in Nos)		50	100	160	230	310	400	400
No of Machines to be required (in Nos)		50	100	160	230	310	400	400
Muga								
Nursery Requirement (in nos)		300000	600000	600000	600000	600000	600000	600000
Plantation Requirement (in Ha)			230	460	460	460	460	460
Commercial seed requirement (D.F.L) Disease free lying	1300000	1300000	1400000	1500000	1600000	1700000	1800000	1800000
Cocoon production (Lac no)	600	650	700	750	800	850	900	900
Raw Silk production (M.T)	12	13	14	15	16	17	18	18
No of farmers to be involved (in Nos)			500	1150	1150	1150	1150	**1150**
Nos of granuers to be involved (in nos)		10	20	30	40	57	77	**107**
No of seed rearers to be involved (in Nos)		30	70	120	170	230	300	**300**
No of commercial rearers to be involved (in Nos)		200	400	600	800	1000	1200	**1200**
No of reelers to be involved (in Nos)			20	40	60	80	100	**120**
No of machines to be required (in Nos)			20	40	60	80	100	**120**
HANDLOOM								
Nos. of weavers to be involved		1400	2900	4600	6300	7000	7000	7000

SERICULTURE								
Indicator Name	**Baseline**	**Cumulative Target Values**						
		YR1	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**YR7 EoP**
Nos. of looms to be acquired				600	1200	1800	1800	1800
Nos. of jacquards to be acquired				300	600	900	900	900
Nos. of accessories to be acquired				800	1600	2400	2400	2400
Increase in eri fabric production (mtrs)	598000	626000	656000	690000	736000	788000	844000	902000
Increase in muga fabric production (mtrs)	198000	201300	211860	222420	237820	254980	272910	291610

242. Development of Silk Value Chain infrastructural assets and scale-up of production

(a) **Raising of Eri and Muga nurseries:** Establishment of systematic eri, Muga food plantations is an essential aspect of silkworm rearing. Eri silkworm requires eri food plants (kesseru) and castor, and Muga silkworm requires som and soalu plants. The sericulture departmental Farms will be involved in raising of the seedlings and supply them to the farmers directly. To meet the target of total 1260 ha of Eri(800 ha)and Muga (460ha) of plantation, 16.00 lacs of both som(6.00lacs) and kesseru(10.00lacs) seedlings will be required. The required quality of both kesseru and som seeds will be collected from natural plantations bearing healthy and robust seeds of the Farms. Each nursery will have a capacity of production of 1.00 lac seedlings for which necessary assistance like fencing, recurring cost of inputs like polytubes, rotten cowdung manure, bio fertilisers, insecticides or fungicides, and other miscellaneous items will be provided from the project while department will provide land, building etc. Total outlay for establishment of nursery is estimated to be Rs 42.40 lakhs (Rs26.50 lakhs for eri and and Rs 15.90 lakhs for muga).

(b) **Procurement of parental seed**: In Muga sector, quality of silkworm seed plays an important role in success of the cocoon crop. The healthy seed with brushing within the scheduled brushing period not only ensures success of the crop but also improve the cocoon productivity and quality. The major bottleneck of the Vanya silk sector is the supply of quality commercial seed to the rearers on time. To organise Vanya silkworm seed on scientific line, the existing seed multiplication system is reorganised for private participation on large scale.

- Breeders Muga Seed Production (By Central Silk Board-CSB)
- Nuclear Seed production (By CSB)
- Basic Seed Production (By State)
- Commercial Seed Production (By private graineurs)

Muga silkworm rearing is solely dependent on the nature. It is always difficult to arrange commercial seed by the rearers themselves. They are dependent on govt. sector to get their basic seed. The department is to conduct a very complicated rearing during the most unfavourable seasons which are generally falls during summer and winter days. To rear the pre basic seed the state department is collecting p2 seed from the Central Silk Board which are maintained by them and are multiplied in the departmental farm and then supplied it to the seed rearers for further multiplication. This is a rearing schedule followed and if the chain is broken in any level the entire multiplication process failed. Hence in the project provisions are made to collect seed from CSB by the state department to rear seed crop.

(c) **Strengthening of the Departmental seed Farms for seed multiplication**: In Muga sector more than 80% of total seed is produced by the rearer themselves without resorting to the prescribed scientific norms. Usually the state supply basic seeds to rearers who in turn produce the seed cocoons and supply the same to the private graineurs to process them. The overall productivity is quite low due to production of seeds in unorganised manner. In the project strengthening of 4 govt Farms are initiated by providing necessary facilities like modern grainage equipments and required consumables. The unit will produce 60,000 disease free silkworm seeds annually. These 60,000 Disease Free Laying (DFL)s will be supplied to the adopted seed rearers for further

multiplication. Total outlay for strengthening of state department's multiplication unit is estimated to be Rs 12 lakhs.

(d) **Support to seed Rearers:** Muga seed multiplication is adversely affected by limited infrastructure, climate change and unpredicted natures furry. These are the main factors in disarraying the seed production and state infrastructure alone cannot meet the entire quantity of commercial seeds due to sparse resources. Thus, Muga commercial seed production is by and large depend on private graineur. Further the basic input, i.e. seed cocoons and its proper linkage and co-ordination with seed crop rearers and seed producer needs to be strengthened. Thus, there is need to support Adopted seed rearers for maintenance of plantation for nutritive leaves and generation of quality seed cocoons by supporting the core needs such as inputs, facilities and right linkages to seed producer. The adopted seed rearers need to be supported with quality inputs like rearing nets, mountage, disinfectants and farm inputs for rearing. Under the component total 300 nos. of adopted seed rearers will be assisted at a total amount of Rs 156.00 lakhs for which unit cost is Rs 52000 each and the sharing pattern between Project and beneficiary will be 80:20.

(e) **Assistance to Muga Private Graineurs:** Muga commercial seed production is basically an entrepreneurial activity. Considering that the entire quantity of Muga F-I seed cannot be produced by the state Govt., it is projected to train private graineurs to undertake commercial seed production activity. Each private graineurs shall have a production capacity of 5000 dfls/crop and 10,000/year. Based on the requirement of commercial seed 107 private graineurs to support production 10.70 lakh commercial seed/year in the project. Private graineurs shall be linked with the adopted seed rearer for generation of seed cocoons and also shall be linked with the commercial Muga cocoon producers by the department. Under the project, total 107 nos. of Muga private graineurs will be assisted with financial involvement of Rs 273 lakhs. The unit cost of the component is Rs 2.55 lakh/private graineurs. The sharing pattern of the scheme is 80:20 (Project; Beneficiary).

(f) **Infrastructural support:** Key infrastructural support to be provided under this component

(i) **Community Jali house**: The component will invest in Community Jali Houses for rearers to gather ripening worms in order to maintain hygiene and protect the worms from predators. It is proposed to establish 150 nos. of Jali houses at an estimated cost of Rs225.00 lakhs at a unit cost of Rs 1.50 lakhs. Priority of construction of Jali houses is on community land else the same will be constructed in nearest govt. farm. Land record documents are collected from the projected districts. Ownership of the Jali houses will be the producer group. If the Jali houses are constructed in the departmental farm necessary MoU will be signed between the producer group and the department.

(ii) **Mounting cum cocoon storage house:** Mounting of silkworm is an essential activity for cocoon production. The improper use of mounting materials and lack of care during mounting of matured worms results in formation of defective cocoons which affect the reeling performance. Even if the silkworm larvae are healthy, it is estimated that producers lose about 5 to 8% of worms at the spinning stage due to improper mountage management. Therefore, mounting cum cocoon houses are projected under this component to improve efficiency at the cocoon production stage. In the project 45 nos. such houses at an estimated cost of Rs 45.00 lakhs with a unit cost of Rs 1.00 lakh. Ownership of the cocoon storage houses will be with the producer group. If the cocoon storage houses are constructed in the departmental farm necessary MoU will be signed between the producer group and the department.

(iii) **Cocoon drying chamber:** In Assam sericulture is practised as a seasonal activity. During the favourable seasons, cocoons are harvested and these harvested cocoons are to be dried & stored for

a long for its use over a period of six months. In Assam sufficient facilities for cocoon drying are not available and the farmers/reelers are practicing sun drying/steam stifling, which is not advisable as it deteriorate the quality of cocoons. To overcome these problems, it is envisaged to support installation of Hot Air Dryers drying units of 50 Kg. capacity considering the topography of the project areas. Such 16 unit of hot air drier will be installed at a total cost of Rs 21.92 lakhs with a unit cost of Rs 1.37 lakh. Ownership of the cocoon drying chamber will be with the producer group if the land is provided by the Group. If the cocoon drying chambers are constructed in the departmental farm necessary MoU will be executed between the producer group and the department.

(g) **Eri cocoon Rearing:** Eri silkworm require utmost care during rearing and spinning of cocoons. Construction of separate rearing house is very essential to ensure hygienic conditions, prevent contamination during rearing and to increase production and productivity. A separate rearing space and sufficient ventilation can significantly improve the cocoon productivity. It is proposed to provide assistance to800 farmers at the total cost of Rs 800.00 lakhs at an unit cost of Rs 1.00 lac.The construction of the rearing houses will be constructed by the beneficiaries themselves through a construction committee with members from the PG and the departmental officials.

(h) **Silk Reeling and Spinning:** Central Silk Board (CSB) designed and developed a reeling-cum-twisting machine, which is suitable for Muga reeling. The mechanisation of reeling and twisting in one single operation has some definite advantage viz. higher productivity, reduced labour, removal of drudgery and importantly generating better quality twisted yarn. The productivity of this unit is 350 gm per 8 hrs. It is projected to provide assistance to 120 reelers at an estimated cost of Rs 72.00 lacs with beneficiary share of 20%. The beneficiary share will have to be paid by the beneficiaries in advance. Further the traditional spinners use mainly for spinning of hand spun silk yarn from cocoon shell and silk waste. They also developed an Eri spinning machine to enhance the earnings of the spinners with 200 grams capacity per 8 hours. Under the project 400 such machines will be supplied at an estimated cost of Rs 32.00 lakhs.

(i) **Establishment of Resham haats:** To eliminate the involvement of middlemen and to create linkage between silk producers/weavers directly with buyers, the component will invest in establishing Resham haats in a strategic manner within the project districts. These Resham haats will be managed by the community with the guidance of departmental officers. Exhibitions, buyer-seller meets and other events will be held on a regular basis to create linkage, increase sales and improve margins for producers and weavers. Five such Resham haats will be established with a financial involvement of Rs. 10.00 Lakhs.

(j) **Augmentation of silkworm food plants**: Under the component, support will be extended to facilitate systematic perennial plantation by applying the integrated package developed by the Research Institutes of Central Silk Board (CSB) by pit system of planting through identified specific varieties of silkworm host plants. The plantations will include the cost of land preparation, seedlings, planting, protection of plants from stray cattle's by erecting of semi permanent goat proof fencing, after care and adoption of technologies involved in establishment and management of new plantation in scientific manner, in addition to costs pertaining to inter/mixed cropping system i.e inter-cultivation. The area expansion programme not only includes raising and maintenance but also intercropping of the pulses, castor and other cash crops so that the farmers earn some income during gestation period and their interest remain intact for the designated activity. Green manuring, vermicompost and use of bio-fertilisers would be popularised and various plant protection technologies like integrated pest management, package for control of leaf diseases would be promoted. It is projected to raise 800ha of Eri and 460 ha of Muga plantation in new areas. Individual farmers shall raise plantations in their own land.

Each farmer will plant 1250 seedlings per one ha of land by following of package of practises with a unit cost of Rs.46200 which include both labour cost and material cost. Provisions have been made for supply of inputs like Farmyard manure and insecticides for maintenance of plantation during 2nd and 3rd year while the labour component has to be met by the farmer. Total provision for establishment and maintenance of systematic plantations is made Rs.582.12 lakhs of which Rs 116.424 will be the beneficiaries share. Each farmer will raise one acre of plantation for which the total no of farmer will be 3150.

(k) **Institutional training**: The training to the producers in group with 42 farmers in 30 groups will be provided for technology dissemination for raising of nursery, improved techniques of systematic plantation, Grainage and rearing by the CSB and the department at various institutions located in the project Districts at a total cost of Rs. 48.00 Lakhs.

(l) **Skill upgradation of reelers and spinners:** Skill enhancement of the stake holders is essential for transfer of improved practises and technologies to the new reelers and spinners .Under the component specialised skill development focussed on reeling and spinning will be conducted through peripatetic and conventional mood. The unit cost per beneficiary is Rs 0.05 each for 900 reelers/spinners for 6days programme that includes cost of training and training consumables, faculty fee, wage compensation. The training will be conducted through ATMA, the role of ATMA in Sericulture will be for technology dissemination amongst Sericulture farmers and ATMA will bring together researchers, extension workers, farmers and other stakeholders for ensuring the effectiveness of the coordination and management of technology dissemination activities within the district. The total cost of the activity is Rs 45.00 lakhs.

(m) **Training to departmental staff:** This programmes aims to equip the field level project personnel with technical, managerial and personal skill required for successful establishment of any sericulture activity, besides develop communication and motivational skill so that they may not only conduct beneficiary training effectively but may be instrumental in setting of the designated activities at the farmers level. The programme would be of 10 days duration with a total cost of Rs 5.00 lakhs.

(n) **Exposure visits for progressive farmers & extension agent:** Visit to the different clusters/establishment/Research institutes to have an exposure to the latest know-how and sericulture technologies and processes in the field at a unit cost of Rs 10000 per head for an envisaged target of 120 nos. with a total cost of Rs.12.00 lakhs.

(o) **Workshop cum seminar:** The sericulture industry by its nature is a network of many non farm and on farm activities and has strong need for many forward and backward linkages. The objective of this programme is to create a common platform to exchange knowledge and ideas in the sericulture field. Four such workshops will be organised including beneficiaries covering the project Districts with a financial involvement of Rs. 8 Lakh.

(p) **Publicity and awareness:** The increasing expansion of the sericulture industry, introduction of new technologies and practises, and changing equations of silk trade etc., necessities repetitive efforts to publicize them in order to generate awareness, for better reach to the farmers/industry. The main objective of the publicity package is to support the expansion of the Vanya silk production activities in Assam, through audio-visual, publications and periodicals, extension literature, exhibitions, buyer-seller meet, awareness programme etc. A total amount of Rs. 96.00 Lakh is provisioned under this activity.

(q) **Skill Upgradation training for weavers**: A systematic skilling program will be undertaken

to improve the basic and advanced skills of handloom weavers and improve their productivity. Skill building will be taken up mainly in 3 three categories, i.e. weaving, design development and Natural Dyeing using vegetable dyes in Eri products. The training period of weaving will be of 45 days and design development and Natural Dyeing using vegetable dyes in Eri products will be of 15 days. . A total amount of Rs. 280.00 Lakh is provisioned for this activity.

(r) **Training to departmental staff:** This programme aims to equip the field level project personnel with technical, managerial and personal skill required for successful implementation of the project, besides develop communication and motivational skill. Total 200 nos. of departmental staff will be trained under this activity with a total amount of Rs. 4.00 Lakh

(s) **State level workshops for cross learning**: The handloom industry very unorganised sector and the progress of the sector is not equally good in various areas. The sector has a strong need for many forward and backward linkages. The objective of this programme is to create a common platform to exchange knowledge and ideas in the handloom field for cross learning through interactive sessions. Twelve such workshops will be organised including beneficiaries covering the project Districts with a financial involvement of Rs. 12.00 Lakh.

(t) **Exposure visits**: To acquire firsthand knowledge in the progressive handloom sector, exposure visits for departmental officers and weavers from the project districts are planned under the project. 100 nos. of selected weavers will be sent on exposure visits with an amount of Rs. 30.00 Lakhs and 40 departmental officers will be given exposure visits with an amount of Rs. 32.00 Lakhs.

(u) **Inputs of new design, value addition**: For innovative design / product development for weavers, this component will establish partnerships with leading design institutions such as NIFT, NID, IICD as well as prominent designers in order to regularly create innovative designs/products. These design prototypes will be created as part of a series of design development workshops with silk weavers, and will be transformed into innovative products for various markets. Total financial provision for this activity is Rs.220.00 Lakhs.

(v) **Brand-building and market outreach activities:** These activities focus on demand side interventions aimed at enhancing the perception of Assam's silk products, building and disseminating key brand values, and establishing relationships in national and international circles. Key activities are:

- **Hand-woven in Assam campaign**: The component will launch a high volume "Hand-woven in Assam" branding campaign using a mix of mass, print and social media to build visibility for Assam's hand-woven silk product brands in national and international markets with a financial provision of Rs. 150.00 Lakhs.
- **Marketing linkages**: To create backward and forward linkages, tie up with existing market players of handloom products like Assam Apex Weaver’s & Artisans Federation Limited (ARTFED) and Assam Governments Marketing Corporation (AGMC) of the state will be executed. Existing market outlets of the agencies will be upgraded with assistance from the project. Total provision for this activity is Rs. 100.00 Lakhs only. For enhancement of market 3 trade Fairs and 8 Buyer Seller Meets will be organised with financial involvement of Rs. 75.00 lakhs and Rs. 18.00 lakhs respectively

(w) **Beneficiary selection criteria:**

(i) The beneficiary must be a traditional rearer/reeler/spinner/weaver with adequate knowledge of Sericulture/Handloom sector for inclusion in the project.

(ii) The beneficiary should have the willingness to take up the activities as per the project.

(iii) The beneficiary should have the ability to contribute their matching share as per project wherever applicable.

(iv) Atleast 30 percent coverage will be given to women throughout the project activities.

(v) As per norms adequate coverage to ST/SC will be given.

(vi) For Commercial rearing activity the rearer must have at-least 1 acre of land should owned/possessed by him/her.

(vii) For seed rearing activity the rearer must have at-least half acre of land with matured soam/soalu systematic plantation with capacity to rear minimum 400 Disease Free Layings per year.

(viii) For Graineurs activity the Graineurs should have the experience of production of quality seeds and should have provision of space to carry out the activity.

(ix) The Graineurs should have financial soundness to purchase seed cocoons from the seed rearers.

Sub-Component C.2: Product Aggregation and Sale through Producer Associations and setting up market intelligence

243. Product aggregation and sale through producer associations and setting up market intelligence: **Overview**: The objective of this sub-component is to organize the producers groups, established under sub-component C1, into farmer producer organizations (FPOs), and develop and strengthen their capacity and skills to more effectively link to input and output markets. This will be achieved by developing a market intelligence system and by providing investment support to these FPOs for establishing common service centers (CSCs).The mobilization of producer groups to FPOs and establishment of common service centers will be carried out by suitably qualified service providers hired by the project. Producer-buyer and market linkage services will be provided by the service provider hired by the project to establish FPOs and through the EDPF and stewardship councils under component A.

The project will support setting up of a market intelligence unit within Assam State Agriculture Marketing Board (ASAMB). The main objectives are to increase information transparency, profitability and market access to the farming community in the project districts. The market intelligence unit, will closely work with the EDPF and stewardship councils under component A, and is expected to provide producers, enterprises and trade intermediaries with relevant information, technical knowledge, and market intelligence; and support diversification and intensification of the production, aimed at responding to market demand and climate variability. The overall aim is to create a conducive environment for direct and sustainable commercial relations between producers/FPOs, and buyers of produce from the targeted value chains. The subcomponent will be implemented by Agriculture Department (Directorate of Agri, Horti, ASAMB) and PCU, ARIAS Society with support from ATMAs (Departments of Horticulture, Animal Husbandry & Veterinary and Fisheries) by setting up farmer operated CSCs and linking famers with different marketing channels. Service providers (about 3) will be hired by PCU for a period of three (3) years to mobilize producer groups, and establish FPOs and handhold FPO in their marketing. Activities to be financed would include:

(a) *Improving the understanding of the supply and the demand of the products of the targeted value chains:* This would include, surveys and diagnostics for the identification, characterization, and mapping of producers and potential buyers; communication and dissemination campaign to inform all actors in the value chains and other potential stakeholders about the scope and rules of the project through local workshops and mass-media outlets. Its aim is to ensure that producers and producers' organizations, potential buyers and providers of goods and services become aware of the opportunities presented by the project. Successful initiatives that can be replicated, will be disseminated widely to share knowledge on promising business opportunities; and creation of an online-based information system on markets, prices, and services, technology, affiliated FPOs, etc. that will be open to all value chain actors.

(b) *Connecting the demand and the supply:* This would include, market studies to identify concrete business and market opportunities for FPOs and buyers at the state, national, and regional level. To enhance producers' prospects of establishing viable and durable commercial relations with buyers, the project will support the identification of buyers that have a demonstrated demand for products generated from the targeted value chains; and facilitating the dialogue with stewardship councils to inform the policy reform agenda for the targeted value chains.

This sub-component will also support the establishment of Common Service Centers (CSCs). The CSCs are conceived as small scale aggregation places owned, managed and operated by FPOs. The project will finance 'productive' demand-driven investments, on a grant basis, to FPOs, for establishing CSCs. It will be provided based on the business plans prepared by them. The grants provided under these activities will be supported at 80 percent of costs with 20 percent contribution in cash by beneficiaries.

Establishment of about 90 common service centers and corresponding FPOs will be supported by the project, primarily focusing on prioritized value chains. These CSCs will better enable FPOs to undertake various activities such as bulk purchase of inputs for sale to individual members, marketing of produce, grading and quality control, and enhancing access to distant and higher value markets and bypassing existing market inequities. The benefits to the members of FPOs are expected to be higher prices through the combination of larger critical mass of saleable produce, thereby providing economies of scale, savings in transaction costs, and strengthened negotiation positions, coupled with the added value achieved through primary grading and packing

Sub-Component C.2.1: Product Aggregation and Sale through Producer Associations

244. **Product aggregation and sale through producer associations**: The main focus of agriculture development programs in the past was on increasing the production and very limited attention was paid to post-harvest management and marketing in Assam. As a result, producers receive a small percentage of consumers spending. Similarly, timely availability, price and quality of agricultural inputs (seed, fertilizers, feed, etc.) are a serious handicap for the farmers. These constraints will be mitigated by strengthening backward and forward linkages to integrate producers and markets, and make the value chains compact and efficient. For achieving this goal, project would organize the producers into FPOs; develop their capacity and skills for post-harvest management, value addition and marketing to access wider markets; and provide investment support to these FPOs for the establishing CSCs. The project will also finance 'productive' demand-driven investments on a matching grant basis to FPOs for establishing these common service centers and will be available on the basis of business plans prepared by them.

245. These farmer managed common service centers will develop organic linkages with suppliers of inputs, buyers and processors of agriculture produce. It is expected that the FPOs will undertake various activities such as bulk purchase of inputs; and post-harvest management, quality control, grading, aggregation and marketing of produce. Expected benefits to FPO members are higher farmer prices through the combination of larger critical mass of saleable produce thereby providing economies of scale, savings in transaction costs, reaching out to distant markets, and strengthened negotiation positions, coupled with the added value achieved through cleaning, grading and packing.

246. Based on the production clusters, FPOs will be formed under the project. For this, members of existing Farmer Interest Groups (FIGs)/Common Interest Groups (CIGs) may be considered or new members will be mobilized to form FIGS and FPOs. Minimum of 20-25 active farmers from existing or newly formed Farmer Interest Group (FIGs)/Common Interest Group (CIGs) will be organized and by federating 20-25 such groups FPO will be formed. This means about 500-600 farmers will form an FPO. The number of members may be more in some cases. The FPOs to be formed under this project will be registered as "Producers Company" "under the Companies Act .The project will have a target of forming 99 nos. of FPOs out of which 43 will be on agriculture and horticulture value chains, 13 on fishery, 38 on pork sector and 5 on handloom & textile sector(silk value chain). {Details are given in *Annex-C.2.1 (a), C.2.1 (b), C.2.1 (c), C.2.1 (d)*. District wise and block-wise FPO and CSC list is annexed at *C.2.1 (e)* (Agri Horti), *C.2.1(f)* (Fishery), *C.2.1 (g)* (Pork).

247. The FPO will have a General Body, Executive Body and Board of Directors. FPOs will be managed professionally by technically trained staff. The process will start with mobilizing and organizing farmers in the clusters as groups. Once the critical mass in terms of number of members is achieved, the FPO will be registered legally. Service Providers will be hired for formation of FPOs and within 18 of months of existence FPOs will be registered as Farmer Producers' Company (FPC).The Service Providers will be

selected through competitive bidding. The service providers will also help in preparation and execution of the Business Plan of the FPO which will be approved and evaluated by Enterprise Development Promotion Facility (EDPF). The FPO will have a share capital which will be contributed by the member farmers. The member farmers will collectively perform the various activities for the benefit of members. The FPO members will engage in production, marketing, value addition etc. in collective or in group basis. For improving togetherness among the farmers in an FPO and to perform various activities in collective and group basis, a physical infrastructure will be established at farmers' level which will be called as farmer Common Service Centre (CSC). The CSCs will be built around farmer producer companies (FPCs) and will be located in production locations. CSCs function will be to improve farmers' incomes by aggregation, basic value addition, grading, packing, logistic support and sales facilitation of agricultural produce and marketing of agricultural inputs like seeds, fertilizers etc.

248. Common Service Centers (CSCs) are conceptually small scale commercially viable entities owned by Producers' Organization. The Common Service Centre is the right place for aggregating the produce, for post harvest handling like drying, cleaning, sorting, grading and packaging etc. of agricultural produce in more hygienic conditions which add value to the produce. Moreover the farmer members of the particular FPO and other farmers of that area can undertake the marketing of Agricultural inputs through the CSC. The CSCs will be functioning on behalf of the member farmers and will also strive to undertake activities of providing input marketing for the production of agricultural produce which will result an added value to the farmers' produce. The limitation of individual farmer with regard to the marketing of the agricultural produce will also be taken care by these CSCs. The purpose of CSCs managed by FPOs can be summarized as below:

- Assist FPO members to plan production and pool the produce for joint marketing,
- It would be established at production location to aggregate the produce before dispatch to markets and/or to conduct auction at CSC level.
- Creating basic infrastructure to facilitate collection, grading and logistics,
- Bulk purchase and marketing of agriculture inputs like seeds, fertilizers, pesticides, etc.,
- Collection and dissemination of information on the marketability of the produce (prices, demand and supply position etc.),
- Facilitate arrangement of services like credit, insurance, transport, packing material, technical inputs etc.

249. The number of CSCs to be established under this project will be need based only. However, it is expected to establish one CSC for one sector in one Block (the no. may be more than one also in some cases) based on the probable production of identified clusters of the selected districts. The tentative nos. of total CSCs will be 99 out of which 43 will be on Agri. & Horti. Sector, 13 on Fishery sector , 38 on Pork sector and 5 on handloom & textile sector. Each CSC will have required civil infrastructure, machinery and equipment for storing, input and output marketing, to undertake post harvest handling and value addition activities. The necessary funds for establishment of CSCs will be provided from this project based on the business plan prepared by FPCs. The CSCs to be established under this project will be owned and managed by FPCs.

250. These CSCs will be linked to Assam State Warehousing Corporation (ASWC) godowns for providing better storage facility for surplus produce where the facility for warehousing godowns will be available in the selected locality. The farmer members of the CSC and other farmers of the locality will store their surplus produce in ASWC godowns and later on sells the produce in the market at better price. Total of 33 warehouse units will be utilized in 8 districts for storage purpose which will increase the volume of warehouse receipts. For this purpose, financial assistance will be provided from this project

for modernizing of ASWC go downs. (Details of modernizing of warehouse and related topics are covered under the Component B).

251. Policy and regulatory environment: The FPOs to be formed under this project will be registered as "Producers' Company" under the "Companies Act and hence they will function as per the policy and regulatory framework of Companies Act and as per the by-laws of the organization which will be framed by the FPO with the help of Service Provider. The management of the organization will be done by the elected board. As the FPOs will be the organization of member farmers, therefore the representatives of farmers will actually manage and oversee the affairs of FPO and CSC. The documents related to land on which CSC to be established will be done as per the Government rules. The land will be either purchased by making contribution by the members or it will be gifted by some member or organization or it may be taken on lease or it may be allotted by the Government. The documentation like sale deed, gift deed, and lease deed respectively will be got registered and kept on record.

252. Eligibility and Selection criteria: All categories of farmers will be eligible to become member of FPO if he or she fulfils the following selection criteria. The major focus will be on small famers.

(a) Selection criteria for membership of FPO

- Willingness of farmers to become members of FPO.
- A member who can contribute his share for development of share capital of FPO and CSC and for development of business of FPO and CSC.
- A farmer who will actively participate in all functions and activities of FPO.

(b) Selection criteria for location of CSC

• Availability of land	:	Yes
• Ownership of the land	:	Panchayat/APMC/Marketing Board/Others
• Extent of land availability	:	Minimum land requirement is 0.25 acre
• Production Related	:	About 500-1000 MT per annum production of potential members of CSC and handling of produce through CSC.
• Infrastructure Related	:	Better road connectivity, linkage to existing markets and easy access to urban markets, availability of electricity and telephone connectivity, drinking water facility, banking facility, etc.

253. Activities to be financed including illustrative list of investments:

(a) **Selection of Service Provider (SP):** The entire process of FPO formation and setting up of CSC will be completed by Service Providers which will be selected through competitive bidding. The contract period with the Service Provider will be for minimum three years (36 months). The project districts will be divided into 3 zones for formation of FPO and establishing CSC and accordingly three (3) Service Providers (SPs) will be hired for 3 zones. The total cost for 3 Service Providers for 3 years will be Rs. 2069.13 Lakh. The procurement policy for hiring of SP will be followed as per the procurement policy of World Bank that is applicable for hiring of consultancy services.

The ideal Service Providers should have better knowledge on FPO formation and the knowledge on CSC and should have the capacity to help the FPOs in preparing and implementing a viable and feasible Business Plan. In a concept like Common Service Centres (CSC), planning and implementation requires innovative strategies that are able to provide balance between supply driven planning and implementation. CSC implementation will be an evolving process, which will require continuous review of planning & implementation strategies and incorporating these changes on continuous basis into future implementation arrangements. It is envisaged that for the above stated reasons, CSC implementation will need a dedicated and experienced professionals (like companies, NGOs etc.,) who can handle the entire CSC implementation cycle starting from community mobilization to consolidation of activities through

FPO. The contract period with the Service Provider will be for 3 years and the contract amount will be decided by the PCU i.e. ARIAS Society based on the activities or works to be undertaken by the Service Provider. Role of Service provider in formation of FPO and setting up of CSC

- Service provider would be supporting till the time the FPOs attain the maturity in terms of managing the business independently either themselves or through hiring required experts/ professionals. The service provider arrangement by the project to FPO would be available for about 36 months (time period would include producer mobilization, capacity building, business plan development, producer company registration, and handholding of FPO) and the FPO on gaining financial autonomy and robust business acumen could deploy its own personnel.
- Service providers may also facilitate obtaining financial support from other government schemes, bilateral/multilateral donor agencies etc., as per its business plans and with prior knowledge and approval from the ARIASS. They would also facilitate the process of seeking the external loan, grants and project based funding for implementing the approved business plan of the FPO.

(b) Process of formation of FPO and setting up of CSC: The entire process of FPO formation and setting up of CSC are described below. As mentioned above, the entire process to be completed by the Service Provider selected for the purpose.

(i) **Baseline survey**: Service Provider(SP) will conduct a baseline survey of the clusters to understand the marketed surplus, commodity profile, crop calendar- planting season, harvest season, map the production flow across months both for current production and future production, area under different crops, information across varieties, potential locations etc. The baseline survey should also detail the various players and their roles in the supply chain like aggregators, transporters, suppliers of agri-inputs, requirement of various agri inputs, availability of road and other related infrastructure, nearest market etc. The baseline survey should also determine the current flow of goods through various intermediaries in the supply chain, the typical cost and margin at each intermediary level, as well as mapping of farmers in the cluster including land holding and social profile. The time period is generally required 0- 3 months.

(ii) **Development of training modules**: During the baselines survey the service provider will find out the training needs assessment of the farmers on production, marketing, use of improved technologies, post-harvest management etc. Based on the training needs assessment and in collaboration with University (AAU/KVK) and/or other reputed organizations Service Provider will develop standardized training modules. After due consultation with the ARIASS, Service Provider will develop a detailed plan for delivering the training to the growers. Emphasis should be given to bring in experts in the respective areas to deliver these trainings. Based on the baseline survey, in consultation with the ARIASS, the service provider will develop a plan for mobilizing the interested farmers in the project area into a common interest group. Once the plan is agreed, service provider using PRI and other techniques would start mobilizing the groups, Service provider should ensure that groups thus mobilized would have sufficient marketed surplus to cater to the optimal capacity of the CSC. . The time period is generally required 0-12 months.

(iii) **Community Mobilization and Formation of Farmer Collectives**:- This will be done by organizing awareness campaigns through various communication aids including pamphlets, documentary movies, posters, regular village-level meetings, etc. to sensitize farmers on farmer collectives/ groups. Discussions will be done with farmers/ opinion leaders to (a) understand key issues/ constraints pertaining to production and marketing of produce, (b) disseminate benefits of a farmer collective/ group to help address these issues and (c) build consensus among the farmers to organize themselves into informal village level farmer collectives / groups. Once the farmers will understand and

come forward to form groups, they will be informally recognised as Common Interest Group (CIG)/Farmer Interest Group (FIG). The timeline for this activity will be 0- 6 months.

At the end of the mobilization process, maturity of the group to be assessed through structured process. Elements of group maturity assessment process would include attendance of members in a group, account opening etc. Service provider would be responsible for opening the accounts for these groups. Service provider would be responsible for setting up a sound governance structure of the groups. Once the maturity is assessed, service provider would also be responsible for training and capacity building (including book keeping, attendance records, and minutes of meeting)

In order to ensure group cohesiveness and generate commercial interest within the group, the service provider will facilitate group sale and group purchase of inputs and outputs. The ideal way of doing this is 'learning by doing' or through 'experimental learning' where in the service provider will have to facilitate groups to undertake market research (for input or output).

(iv) **Capacity building of CRPs & other members through training & exposure visit**: In order to assist the farmer members in availing the services that may be provided by the FPOs, Community Resource Persons (CRPs) will be identified from respective group taking into consideration of their (a) educational background and (b) communication and leadership skills. As part of the capacity building program, CRPs will be provided training on following key training modules:

- FPO Management
- Book keeping /accountancy
- Group marketing

Trainings will be provided by Assam agricultural University (AAU) and other agency that will be hired by the ARIAS society for providing training(s). These training programmes will train the CRPs as master trainers to enable them to deliver training to other CRPs and farmer members in the Farmer Collectives/ FPOs. There will be 5 CRPs in one FPO and the nos. of trainings will be three viz. FPO management, book keeping and group marketing etc. The timeline will be 6- 12 months. The total nos. of trainees will be seven (7) per FPO (5 CRP & 2 office bearers) and nos. of trainings will be three of one day duration. The total cost will be around Rs. 20.79 Lakh @ Rs. 0.21 lakh per FPO.(Rs. 0.21 LakhX 99FPOs=Rs. 20.79 Lakh)..

Since ""seeing is believing" hence 5 CRPs along with 3 lead farmers from each FIG/CIG will be sent to exposure visit (within the state) to reputed organization, farmers' field, research stations etc. to have a better knowledge on technology, methods etc. to improve the skill of the farmers and office bearers. There will be 20-25 FIG/CIG in one FPO, hence eighty (80) members. (25 FIG/CIGx3+5 CRPs) will be sent to exposure visit from each FPO in two batches each batch having forty (40) members. The total cost will be around Rs.554.40 Lakh @ Rs. 5.60 lakh per FPO. (Rs. 5.60 lakhX99 FPOs=Rs.554.40 Lakh).

(v) **FPO Registration stage**: After the groups (common interest groups – CIGs) will be mobilized service provider would initiate federating these CIGs into a well-structured farmer producer organization with the aim to register under producer Company Act. Service provider will facilitate and guide the FPOs in preparing the by-laws, setting up of a sound governance structure of the FPC, registering with the registrar of companies, and associated tasks related to the registration process. The total cost for registration and for other preoperative expenses will be around Rs. 74.25 Lakh @ Rs.0 .75 Lakh (Rs.75 Lakh X 99 FPOs=Rs. 74.25 Lakh). Service provider will also facilitate and take necessary steps to determine the paid up and subscribed capital of FPO, collection of share capital for the FPO, facilitating the membership fee structures, account opening in the name of the FPO.

At the same time formal Board of Directors will be elected by organizing General Meeting among the members. In addition to registration process, an operation manual will be prepared detailing the principles, procedures and provisions for (a) procurement of goods & services, (b) to undertake financial transactions along with fund flow system and (c) marketing of produce of the FPO to ensure effective operation of the FPO. The timeline for this activity will be around 12-18 months.

(vi) **FPO establishment stage (development of Business Plan) (**The timeline for this activity will be around 0- 24 months)**:** After bulk sale and purchase by the CIGs and while the CIGs are in the process of federating into a company, the service provider would need to initiate a business plan for the FPO. The business plan should pick up the elements from the baseline survey, namely how the current supply chain inefficiencies can be addressed through the CSC (both for agri input and output). In consultation with the CIG members, location of the CSC will be established. While identifying and finalizing the location of the CSC, the service provider needs to take into consideration the availability of land on a long term lease, access to road and other related infrastructure. Based on the illustrative CSC investment estimate prepared by the project, service provider will discuss the specific needs of each FPO. Based on which investment plan for the CSC will be prepared and it will become part of the business plan of the FPO.

The business plan thus prepared by the FPO, after scrutiny by the Enterprise Development Promotion Facility (EDPF) would be funded by the project on a matching grant basis. Business plan should also mention the various approval that are needed for operating the business by the FPO and clearly state if these have been obtained (for e.g. licenses for seed, fertilizer and pesticide business, trade license, Licence for pollution control, as needed, power connection, if there are any other approval that are needed.) Business Plan of FPO will incorporate the following:-

- Vision, Mission and key Objectives of the FPO
- Key Issues and potential services to be provided by the FPO along with the business model
- Governance structure and role and responsibility of key role holders
- Financial projections (including P&L statement, Balance sheet and Cash flow statement) for the identified business activities to be undertaken by the FPO

(vii) **Implementation of Business Plan**: Once the business plan is approved, project would sign grant agreement with the FPO. Once the business plan is funded by the project, it is expected that the service provider would provide 1 to 2 years of handholding support to these FPO for not only managing the CSC as a viable enterprise but also support the management of the FPO. SP would need to facilitate market access of these FPOs – through business promotion, tie-up with buyers, preparation of a database of input sellers and output buyers, etc.

(c) **Setting up of CSC**: The CSCs to be established under this project will be based on marketable surplus of the commodity in the production clusters. However based on the data available the probable blocks (clusters) have been identified for establishing CSC for different commodity.(exact nos. will be finalized after baseline survey only.)The nos. of CSC on Agri. & Horti value chain will be forty three (43), for fishery sector thirteen (13) ,for Pork (Pig) sector thirty eight (38) and for handloom & textile sector 5(five).For Agri. Horti sector same CSCs will be utilized for handling multi-commodity. The funding for CSCs will be based on B-Plan prepared by the FPO (already explained above), however illustrative cost for establishing CSC is calculated and annexed in different annexes. There will be two stages of funding for CSC viz., stage-I which includes infrastructure & machinery/equipments cost and stage-II funding which includes value addition activities. This stage-II cost is especially applicable for Fishery sector CSC and handloom & textile sector CSC.

The stage-I funding for Agri. & Horti sector CSC including infrastructure and some common furniture material/equipment etc. will be around 16.00 lakh per CSC and the cost for need based machinery/equipment for CSC on grains and oilseeds will be around 8.00 lakh/CSC, for banana 1.00 lakh/CSC and for vegetables and ginger it will be around 1.00 lakh/CSC. Since the same CSC on Agri. & Horti sector will be utilized for handling multi-commodity, hence the cost of one CSC on Agri. & Horti. sector will be 25.00 lakh(including infrastructure & machinery/equipment cost), out of which 20 % will be farmers' contribution. [Details at *Annex-C.2.1(h)]* (Infrastructure cost for Agri Horti), *Annex C.2.1(i)* (Machinery cost for food grains/mustard), *Annex C.2.1(j)* (Machinery cost for banana), and *Annex C.2.1(k)* (Machinery cost for vegetables).

Similarly the stage-I funding for one CSC for fishery will be around 16.00 lakh (including infrastructure & machinery/equipment cost), out of which 20 % will be farmers' contribution. (details are provided at *Annex-C.2.1(l)* for Fishery.The total cost for stage –II funding for CSC on fishery sector will be around Rs. 245.00 Lakh out of which 25 % will be beneficiary share.

Likewise the stage-I funding for one CSC on Pork sector will be around 20.00 lakh (including infrastructure & machinery/equipment cost), out of which 20 % will be farmers' contribution. (detail are available at *Annex-C.2.1(m)* for Pork.

The stage –I funding for one CSC on handloom and textile will be around Rs. 40.00 Lakh lakh (including infrastructure & machinery/equipment cost), out of which 20 % will be farmers' contribution *[(details are available at Annex-C.2.1(n)].* The total cost for stage –II funding for CSC on handloom and textile sector (silk value chain) will be around Rs. 52 Lakh out of which 25 % will be beneficiary share. After the b-plans of FPOs for CSCs, are reviewed by EDPF and approved by PIU and PCU, a Memorundum of Agreement (MoA) for release of project grant will be signed with the FPO. The generic template of MoA is provided in *Annex C2.1(o).* After signing of MoA by both parties, the first tranch of grant amount will be released and deposited in the separate account opened by FPO in any scheduled bank for the purpse. The second tranch will be released only after submission of Statement of Expenditure (SoE) and Utilization Certificate (UC).

The over-all cost (stage-I & stage-II) for establishing CSCs on all sectors will be around Rs. 2540 Lakh.

(d) **Value addition activities to be undertaken in Fishery CSC (stage-II): -** There is considerable market demand for value-added fish products such as fish pickle, fish fingers, fish sauce, packaged dressed fish, fish fillets, dry fish, fermented fish, etc., for which selected NGOs/SHGs/ Co-operative Societies which are presently involved in similar business in small - scale, will be supported under this project after bringing them into the ambit of FPO.

(i) **Live fish transportation support to FPOs:** In the present days, consumers' demand is gradually shifting towards fish in live condition. Accordingly, fish transportation system has also evolved. A considerable quantity of locally produced fish is transported in live condition in specially designed plastic bins reinforced with bamboo and iron frames as support and fitted on four-wheelers. About 2.5 to 4 quintals of live/wet fish stocked in these bins containing sufficient quantum of water are transported to nearby markets. Water in the bins are continuously stirred by two-three persons during transportation. This action causes mortality of fish to the extent of about 20-25% of fish in the container. The project will extend support to the FPOs by providing mechanical devices/ aerators for installing in their live fish transportation vans. This will help the FPOs to transport fish in live condition without mortality and help them get better price. 25% of the unit cost of Rs.0.30 lakh for each such device will be shared by the FPOs.

(ii) **Flake ice manufacturing unit to FPOs**: The project will extend technical and financial support to the FPOs to maintain quality of fish during transportation to distant markets by providing one mobile flake ice manufacturing unit to each CSC. The unit will be run and managed by the FPO themselves for which the selected members will be adequately trained. The unit cost for each ice unit is Rs.5.00 lakh of which the FPO's share will be 25%.

(iii) **Fish processing-Value Addition**: The women SHGs mostly organized in the districts of Barpeta, Jorhat, Kamrup, Lakhimpur and Nalbari have taken up fish processing for preparation of fish pickle, fish sauce, dry fish, fermented fish in special form, etc., and are presently earning considerable amount for maintaining their families. The women groups have shown considerable interest in taking up the aforesaid supplementary livelihood activities, in the recent stakeholders' meet held in the PIU/PCU, on production of value-added fish products. It is, therefore, proposed to provide support to these five groups in the form of common facilities like (i) a processing unit to be created preferably in the office campus of the District Fishery Offices of the five districts or, attached to the nearest CSCs and managed by these groups, and (ii) minimum equipment/utensils to run their business.

A modality will be designed for its efficient management. Two societies are presently involved in preparation of fermented fish ('sidal') in Cachar district and three societies/SHGs are involved in fish drying in Goalpara, Jorhat (Majuli) and Nalbari district and marketing the product within and outside the state. The project proposes to up-scale their activities of production of value-added items to have wider markets in the neighbouring NE states. It is also proposed to go for production of ready-to-cook packaged fish by one FPO in Kamrup district. The processing unit will be set up attached to the CSC of the FPO The ready-to-cook fish will have considerable markets in big towns in the state and the FPOs can have tie-ups with city malls and departmental stores for marketing of their produce. The unit cost of these 10 units is estimated to be Rs.15.00 lakh each. 25% of the cost is proposed to be the beneficiaries' share while the balance will be borne by the project

254. Operational services of CSCs: The following operational services may be utilized by the members of an FPO after availing the services provided by the CSC.

- Take their produce to ASWC warehouse or sell in rural haats or at suitable markets.
- Avail bank finance against their produce through Warehouse Receipts Financing from Banks for the produce store in ASWC warehouse.
- They can sell the produce on spot or in future market depending on the price situation through the ASWC warehouse.
- The produce can be sold to direct marketing license holder who may be a trader, exporter, processor or retail chain operator.
- Can do input marketing or supply of inputs.

255. Sustainability: Since this project will provide grants for establishing CSCs for different commodities to undertake various activities by the member farmers of FPO and sometimes by non-member farmers of FPO which will give better economic return to the farmers, hence investment in this sector will be economically sustainable. Farmers' share will be collected and the profits of the business will be distributed among the farmers. Since farmer will contribute share, hence the interest of the farmers will be more towards CSC and thereby CSC will sustain even after the project also.

As the CSC will have a link with the local markets and other rural haats, hence the farmers will take the opportunities of selling their produce at rural haats and in suitable markets at better price, so it will enhance the income and will remain economically sustainable. The difficulty in obtaining quality inputs by individual farmer will also be taken care of by the CSC through input marketing and hence the interest of the farmers towards CSC can be increased and more farmers will avail the facilities provided

by the CSC and thus the CSC will remain sustainable even after the project also. Another important point is that the members of an FPO will perform their activities on self-help and community basis which will enhance the social bindings among the famers in a society and thus social sustainability will also be maintained.

256. Institutional and implementation arrangements: As mentioned above, one FPO will have minimum 500-600 farmer members from 20-25 FIGs/CIGs each consisting of 20-25 members. The members will perform the activities on the principles of self-help and willingness to work together as a group. The FPO will have a General Body, Executive Body and Board of Directors. FPOs will be managed professionally by technically trained staff. The process will start with mobilizing and organizing farmers in the clusters as groups. Once the critical mass in terms of number of members is achieved, the FPO will be registered legally. They will have a record and reporting system which will be maintained by one member of the FPO. They will also provide necessary information such as name of FPO, members' name, registration no., areas of operation, etc. to the ARIAS Society, so that ARIAS Society can make it public through its website. The FPOs will have a staffing pattern with para professional who will maintain records and accounting system and he will be responsible for maintaining records of CSC also.

The CSC to be established under this project will be owned and managed by FPO. If possible, CSC can be established in Government land, in the premises of member based organization or in the premises of rural haats. Private land can also be used when provided by members or on lease basis. FPO may also purchase minimum area of land resources by making contribution from the members. The documents related to land on which CSCs to be established will be done as per the Government rules and regulations.

Department of Agriculture (both directorate of Agriculture and Horticulture) will act as Operational Project Implementation Unit (OPIU) for formation of FPO and establishment of CSC on Agri. and Horti. sector and directorate of Fishery will act as OPIU for Fishery FPO and CSC , Animal Husbandry and Veterinary department will act as OPIU for Piggery (Pork) FPO and CSC with the help of Assam Livestock and Poultry Corporation Limited (ALPCO) and Department of Handloom and Textile will act as OPIU for Handloom and textile (silk value chain) FPO and CSC. Each PIU will have required officers and associated staff. The departments/agency at state level will coordinate with their respective district level offices for on ground implementation of activities. Selection of suitable Service Providers will be done by the Agriculture department with the help of Project Coordination Unit (PCU) of ARIAS society. The central level coordination of all the project activities will be carried out from Project Coordination Unit (PCU) located at ARIAS Society. The PCU will coordinate with respective departments/agency at state level to accomplish the targeted activities.

257. Risk and mitigation measures: The risks and mitigation measures are as follows-

Perceived Risks	Mitigation measures
Delay in formation of FPOs and their subsequent activity	A Service Provider will be hired well in advance for various activities starting from group formation to overseeing the execution of activities.
Improper selection of site for CSC	Service Provider will select the proper site as per the guidance & supervision of the concerned department.
Inadequate knowledge of member farmers on technical and management skill	Capacity building of member farmers through training, exposure visit by Service Provider is proposed.
Delay in release of funds to the contractors and also for various activities	A proper MOU to be prepared defining roles and responsibilities and time limit for release of funds by the beneficiaries, PIU (department concerned) and Service Provider .
Non transparency of funds, ownership risk	As the individual producer/member of FPO is the owner of the facility, so such risks are not involved.

258. Results Chain and Results Framework

(a) Results Chain

Sub-Component	Activities	Sub Activities	Output	Outcome
Setting up OF Farmers CSCs (Managed by FPOs) for Accessing Input and Output Markets;	Formation of Farm Producer's Organizations (FPOs)	Formation of groups from amongst the sensitized farmers on collectives	Increased number of FPO's registered	Increased marketed surplus and farmer's income
		Development of plan for FPOs		
		Registration of the FPOs		
	Establishing Common Service Centres (CSC) at Block level	Identification of land	Increased number of farmers availing CSC facilities	Increased marketed surplus and farmer's income
		Identification of resources available		
		Construction, civil works and physical infrastructure development and provision of manpower		
	Adopting better Post Harvest Handling Practices by farmers	Sensitizing farmers on the benefits of better post harvest handling practices	Increased number of farmers adopting better PH handling practices	Minimizing post harvest losses
		Providing farm specific infrastructure on post harvest handling on group basis	Increased number of farmers using on farm post harvest handling practices using project supported physical facilities	Minimizing post harvest losses

(b) Result Framework

Indicators	BASELINE	YR1	YR2	YR3	YR4	YR5	YR6	YR7 (EoP)
Formation of Farm Producer's Organizations (FPO) (Nos)	0	0	60	100	100	100	100	100
Registration of FPOs (Nos)	0	0	60	100	100	100	100	100
Development of Business Plan for FPO (Nos)	0	0	60	100	100	100	100	100
Setting up of CSC (Nos)	0	0	0	60	100	100	100	100
Nos. of CSC in operation(Nos.)	0	0	0	0	60	100	100	100

Sub-Component C2.2: Setting up market intelligence Cell

259. Background: The focus of this activity is to increase information transparency, profitability and market access to the farming community in the project districts. The market intelligence cell, will closely work with the Enterprise Development and Promotion Facility (EDPF) and stewardship councils under component A, and is expected to provide producers, enterprises and trade intermediaries with relevant information, technical knowledge, and market intelligence; and support diversification and intensification of the production, aimed at responding to market demand and climate variability.

260. Objectives: The purpose of Establishing Agricultural Market Intelligence Centre is two fold:

(a) Improving the understanding of the supply and the demand of the products of the targeted value chains: This would include, surveys and diagnostics for the identification, characterization, and mapping of producers and potential buyers; communication and dissemination campaign to inform all actors in the value chains and other potential stakeholders about the scope and rules of the project through local workshops and mass-media outlets. Its aim is to ensure that producers and producers' organizations, potential buyers and providers of goods and services become aware of the opportunities presented by the project. Successful initiatives that can be replicated, will be disseminated widely to share knowledge on promising business opportunities; and creation of an online-based information system on markets, prices, and services, technology, affiliated FPOs, etc., that will be open to all value chain actors.

(b) Connecting the demand and the supply: This would include, market studies to identify concrete business and market opportunities for FPOs and buyers at the state, national, and regional level. To enhance producers' prospects of establishing viable and durable commercial relations with buyers, the project will support the identification of buyers that have a demonstrated demand for products generated from the targeted value chains; and facilitating the dialogue with stewardship councils to inform the policy reform agenda for the targeted value chains.

261. Policy and Regulation Environment: In Assam, the agricultural marketing activities are regulated by Government of Assam, through The Assam Agricultural Produce Market Act, 1972 and amended upto 2006. As per this act, the market areas are notified, Market Committees and State Agricultural Marketing Board are established to regulate the marketing activities in agricultural commodities. As per this Act, Principal and Sub Market yards are established. All specified agricultural produce shall ordinarily be sold in the principal market yard/ sub market yard. At the same time they may also be sold in private market yards, or market yards owned by Panchayat Raj institutions. Whenever the produce is raised under contract farming, the produce could be directly procured by the contract firm.

(a) There are 24 Regulated Market Committees/ Principal market yards in the State but only 20 are declared. The transactions in these market yards are mainly in Jute. All the private, panchayat / municipal market yards present a mixed atmosphere. Farmers' produce are purchased by Wholesalers through brokers/commission agents at one side of the yard, retailers are doing their business in another side, all products – agriculture, plastic, household articles, grocery – are sold in the same market yard. The market yards could be defined as shandies on the above terms. Farmer is paying brokerage or commission charges to the concerned besides paying the entry fees to sell his produce in the market yard. Entry fees is absent in the Regulated Market Yards of the ASAMB.

(b) The enforcement of market regulation by the ASAMB is very weak in toto. Market price reporting is compulsory at the level of market yards operated by the ASAMB. But it is not maintained properly. Market price dissemination is through the website of the ASAMB only. How many farmers go

through this website that too in English – is a question mark. In short, it could be arrived at that Agricultural Marketing is in its primitive stage in Assam comparing to other States of India like Maharashtra, Karnataka, Tamil Nadu etc.

(c) Reporting arrival, a minimum, maximum and median price has to be made mandatory for all the principal and sub market yards operated by SAMB. This has to report through News Papers and TV besides to the SAMB and the same has to be recorded for maintenance through years. The second thing is connectivity and data networking of markets. These are the basic and essential items of work to be attended to by the SAMB immediately.

(d) But whatever may be the policy and regulation environment, it is not going to affect the dissemination of the Market Intelligence since it is programmed through primarily News Papers, TV channels, and Radio, SMS and Voice mails through mobile phones. Dissemination through officials of SAMB is viewed as a secondary one only.

262. Eligibility and Selection Criteria: The market advisories prepared based on price forecasts are meant for all the growers of the crops concerned in the selected districts of the Project. All the queries/clarifications by the growers in these districts are to be answered with over phone/post. In case of training, farmers growing the crops concerned for which price forecasts are already made will be selected. In case of training to officials, field level functionaries and agricultural officers in the districts concerned will be selected. In case of dissemination of market intelligence, all News papers in Assamese language in the different regions with in the districts selected and all English News papers will be selected. Agricultural Magazines in regional language only will be offered with the dissemination process. In case of telecasting, Doordharshan TV and all private and local TVs will be taken for the purpose. In case of Radio the All India Radio Stations in different areas and the FM radios and community radios will be preferred.

263. Institutional and Implementation Arrangements: The proposed Agricultural Market Intelligence Centre will be established at ASAMB. For setting up and managing the Market Intelligence Cell (MIC), the project will hire a Consultancy Firm on competitive basis.

(a) The MIC will be manned by (i) Chief Economist cum Team Leader, (ii) Market Analyst, (iii) Research Officer and (iv) IT Officer

(b) The progress of work of MIC will be monitored by CEO, ASAMB. Chief Economist cum Team Leader will be reporting to CEO, ASAMB. Other staff in MIC will be reporting to Chief Economist cum Team Leader. The MIC consultant will prepare an Annual Work Plan (AWP) and submit to CEO, ASAMB, The AWP will be reviewed by CEO, ASAMB and sent to SPD, ARIAS Society for approval.

(c) The Consultant will report the monthly progress to CEO, ASAMB and quarterly progress to SPD ARIAS Society through, CEO, ASAMB.

(d) A committee consisting of the Project Director of Assam Agri. business and Rural Transformation Project, Director of Agriculture, after reviewing the progress of works done by the Agricultural Market Intelligence Cell, Assam will offer suggestions to further improve functioning of the same.

(e) The activities of the MIC will be coordinated by OPIU-ASAMB.

264. Activities to be taken up and Illustrative List of Investment: The Agricultural Market Intelligence Centre in Assam will be placed at Assam State Agricultural Marketing Board (ASAMB) and will carry out the following activities:

(a) **Price forecasting (to be done by MIC Consultant):** Price forecasting steps shall include:

- Collection of weekly/monthly price data over a period of years, preferably 20 years. This is taken from the records of the Agricultural Produce Market Committees (APMCs)
- Validating the price data collected by checking every observation for wide ups and downs, analyzing the reasons for same, accepting or correcting the observation concerned.
- Analysis of price data using different software packages and selecting the best forecast using MAPE (Minimum Absolute Percentage Error) method.
- Undertaking Trader's surveys and comparing the forecast with traders' opinion.
- Comparing the forecast with futures prices published by MCX, NCDEX etc.
- Discussion with Trade Associations (South India Cotton Association – in case of Cotton, Solvent Extraction Association of India in case of oil seeds)
- Comparing the price forecast with international publications like those of USDA.
- Based on all the above finalizing the forecast.

(b) **Dissemination of Market intelligence (to be done by MIC Consultant)**: The price forecasts and other market advisories are to be disseminated in time and as understandable by farmers and other stake holders. The dissemination channels *inter alia* include :

- News papers in regional language and English.
- All India Radio, FM broad casts, Community Radio etc.
- TV channels (National – DD and private channels and in News channels as scrolls)
- Officials of Department of Agriculture and Agricultural Marketing.
- Cell Phone – by way of SMS and Voice mail, at free of cost in the regional language.
- Producers' Associations.
- Creation of a website exclusively for the purpose in Assamese and English languages.
- Training groups of farmers on the use of market intelligence.
- Training field level personnel of the Department of Agriculture on the above.

(c) **Diagnostic study (to be done by MIC Consultant):** The diagnostic study would include surveys and investigations for the identification, characterization, and mapping of producers and potential buyers of APART commodities. The aim of the study would be to understand the market intelligence requirements of farmers and other agri value chain players in the targeted districts.

(d) **Communication and Dissemination Campaign (to be done by MIC Consultant):** The objective of Communication and dissemination campaign will be to inform all actors in the value chains and other potential stakeholders about the scope and rules of the project through local workshops and mass-media outlets. Its aim is to ensure that producers and producers' organizations, potential buyers and providers of goods and services become aware of the opportunities presented by the project. One workshop will be conducted each year in each targeted district with minimum 100 participants in each workshop. Mass media release in local TV will one per quarter and that in Assamese newspaper will be one per two months.

(e) **Creation of web portal for MIC:** A separate dynamic web portal will be created for MIC which will be linked to ASAMB website and ARIAS Society website. The web portal will display daily prices of commodities, price forecasts, crop advisory as per season, weather forecast information. Commodity profiles, diagnostic study, study on business and market opportunities will also be made available on the web portal. These will be in a downloadable format. Also, it will have information on commodity buyers, service providers, exporters, importers etc as the case may be. The web portal will be multi lingual (English, Assamese, Hindi) and will be interactive where users can post their queries related to market

intelligence as well as provide general feedback for improvement. The MIC will ensure that these enquiries are responded to in a timely manner. It will also have provision of counting the number of users visiting the web portal, time spent on the portal and time spent in each section of the portal. The portal may also be linked to other useful websites such as APEDA, Agmarknet, NABARD, Deptt of Agri (GoA), Ministry of Agri (GoI) etc.

(f) **Study on Business and Market Opportunities for FPOs (to be done by MIC Consultant):** This will be an in-depth study covering all the FPOs formed in the project and would be initiated at the beginning of third project year when all the FPOs have been organized but not necessarily registered. The study would explore alternative and innovative marketing channels and opportunities for each of the FPOs. Apart from this the study would also cover business development opportunities for the FPOs. The study would be of nine months duration and should be completed by the end of year 3.

(g) **Study on Market Led Production of APART Commodities (to be done by MIC Consultant):** This will be six months long study to be initiated in the beginning of year-2 of project and will be completed within six months. The study would cover for each commodity market quality, standards, expectations of the buyers (aggregators, traders, wholesalers, retailers, consumers). Accordingly, the study will also make recommendations for primary producers for market production and other value chain players for market led handling/processing (primary and secondary). The results will feed into the market led extension program of Agricultural Technology Management Agencies (ATMAs). Tentatively 16 commodities will be covered including livestock and fish.

(h) **Survey of Agri Value Chain Stakeholders (to be done by MIC Consultant):** The consultant will conduct a detailed survey of importers, exporters, transporters, processors, bulk buyers, traders, aggregators, input suppliers, growers, grower organizations/FPOs of APART Commodities. Their requirements w.r.t. quantity, quality, seasonality and other specifications would be documented and disseminated widely through MIC. This database will be constantly updated and also displayed on the web portal of MIC, ASAMB and ARIAS Society. Customized extracts of this database will also be used in advisories issued by Market Intelligence Cell through various channels including SMS.

(i) **Development of Commodity Profiles (to be done by MIC Consultant):** Commodity profiles of 16 project commodities will be prepared by the Consultant. These commodity profiles will include information on input supplies, production, post harvest management and processing, markets, buyers, major players, consumer expectations, business opportunities etc. These commodity profiles will be continuously updated and uploaded on the MIC portal, websites of ASAMB and ARIAS Society. Copies will also be supplied to EDPF offices and other relevant stakeholders.

(j) **Engagement of International expertise in agro logistics and supply chain management:** The project will explore collaboration with Wageningen University to bring in international best practices in agro logistics and supply chain management (as part of the MoU signed between the Government of the Netherlands and the World Bank). Pilot implementation and redesign of around five agri-food value chains, including identification and selection of product-market combinations is planned. It is planed that 10 product market combinations will explored and 10 value chains will be redesigned. Out of these 10, five may be piloted and maximum five may be replicated.

265. Estimated Cost: The estimated cost for setting up and managing MIC is Rs. 1800 lakhs as given in the table below. Details are provided in cost tables.

									Rs. lakhs
SL	**Item of Expenditure**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Total**
1	Diagnostic Study, Market Data collection, User feedback, Surveys etc	63	6	6	6	6	6	6	99
2	MIC Web Interface	15	10	10	6	6	6	6	56
3	Consultancy Services for Technical Assistance on MI	110	99	71	71	71	71	71	565
4	International Collaboration with Wageningen University	100	100	220	220	220	220	-	1080
5	**Total**	**288**	**215**	**307**	**303**	**303**	**303**	**83**	**1800**

266. Sustainability: The project is for a period of seven years. Within this period it is possible to develop a large number of price forecasts and market advisories and earn popularity and confidence of farmers, officials and policy makers. With the reputation gained it is possible to convince the Government of Assam/ officials of ASAMB for continuation of the Project after funding by World Bank is over. The usefulness of the market intelligence combined with the good will earned will pave way for the continuation of the project and also the budget is not high.

267. Risks and Mitigation Measures: Due to effect of random and unpredictable variables like flood, heavy rains in any part of Assam will affect the accuracy of the forecast. Similarly the export and import policies of the Government of India will also play a role in influencing domestic prices. Caution is given forecast itself that it is based on normal weather conditions and subjected to changes in policies of the State and Central Governments.

268. Key Output Indicators and Intermediate Level Indicators: The overall output of this project is availability and improved capacity to access and use market intelligence in guiding production and marketing of agricultural commodities so that farmers of Assam could attain higher net prices and net profits. The overall output is achieved through the following intermediate outputs:

- Establishment of a price forecasting system for major agricultural and horticultural commodities grown in different regions of Assam;
- Improved quality of market intelligence for the selected commodities;
- Improved dissemination of marketing information relevant to the supply chain; and
- Improved capacity to absorb market intelligence by all the stake holders concerned.

(a) The performance targets for the intermediate output on commodity price forecasting are (i) an operational system of price forecasting for the select crops, preparation of forecast calendar and (ii) making the price forecasts/ market intelligence available to farmers and other stake holders at village/ farm level at least twice – before sowing and during harvest for each select crop. The market advisories developed will be disseminated in Regional and English News Papers, Radio, Television, Agricultural Magazines (Regional Language) and through mobile phones of farmers, producer associations, officers of Agricultural Department of Assam, Agricultural Product Market Committees by way of SMS and Voice mail. Separate websites in Assamese Language and English will be created for dissemination purpose and the same will be linked to national and international websites dealing in agricultural marketing and agricultural prices.

(b) The performance targets for the intermediate out put on improved quality of market intelligence consists of (i) arriving at maximum accuracy level in price forecasts by way of comparing the computed forecasts with futures prices, traders' opinions, prices and price trends reported in

international and national commodity reports besides having discussions with commodity traders/processors associations

(c) The select commodities for the purpose are autumn rice, winter rice, summer rice, maize, pea, black gram, rape seed and mustard, onion, ginger, potato, turmeric and cabbage.

(d) The performance target for the intermediate output on improved dissemination of marketing information are (i) Training groups of farmers in access and use of market intelligence developed by the Agricultural Market Intelligence Centre, (ii) Training the field level functionaries of Department of Agriculture, Horticulture, APMC s and NGOs on the above; (iii) The above are besides dissemination through mass media like News Papers, TV, Radio, Mobile Phones etc.

(e) The performance targets for the intermediate output on improved capacity to absorb and use market intelligence are (i) conducting post –training surveys among trained farmers and officers on the use of market intelligence and making corrections accordingly in content and methodology of training; (ii) Involving the officials of agricultural and horticultural departments in the preparation and methodology of training.

(f) In the first year sowing + harvest/ storage advisories will be given to four or five crops. The forecasts will be 8 or 10. The SMS will be around 5000/- (Five thousand) and around 2000 Voice mails will be dispatched. It will be 20-22 forecasts from second year onwards. The SMS and Voice mails will be around 20,000/- each.

The Joint Directors of agriculture in each district will provide at least 1,000(One thousand) cell phone numbers of farmers in the districts concerned. The Director of Agriculture, Govt. of Assam will issue a circular/ direction to all the Joint Director concerned in this regard.

Sub-Component C3: Facilitating access to and responsible use of financial services

269. Facilitating access to and responsible use of financial services: **Overview**: This subcomponent focuses on three basic activities to facilitate access to and responsible use of financial services for the project beneficiaries; and thereby help them better manage their cash flows, make productivity enhancing investments, and better manage the business and non-business risks they face: (i) data collection and diagnostics on demand and supply of financial services; (ii) financial services sub-projects to help test innovations and scale-up tested innovations; and (iii) financial education and counselling. Beneficiaries will include producers, producer organizations, and other enterprises in the value chains supported by the project.

270. Background: Different studies have reflected that there is a strong demand for both credit and savings services in the state including the rural areas which is presently being met from the informal sector. However, the agricultural sector in the state suffers from not having even the informal sector taking care of the larger investment and working capital needs of the sector, thus leading to sub-optimal solutions. There is therefore a huge involuntary exclusion of the rural households from these services. The poor financial outreach by the banks is because of constraints on the supply side which inhibits them to provide financial access to the rural households. These constrains are attributable to information asymmetry and adverse selection, risks and high transaction costs involved in the supply of finance especially to agriculture sector. On the demand side, there are problems associated with poor understanding of the financial products and services of the formal system by the rural households leading to voluntary exclusion by the rural households. Poor financial awareness of the bank products also allow for mis-selling and different practices adopted by branch managers to restrict credit flow to the target clients.

271. Objectives of the sub-component: Overall objective of this sub-component is to facilitate access to a broad set of financial services and their responsible use by the target group (farmers, agri-business entrepreneurs, enterprises, aggregators, and district level co-ops etc.

272. Activities to be financed: To achieve the above-mentioned objectives, following is the illustrative list of activities, planned in the project

(a) **Diagnostic & Demand survey:** Very little information is available on the supply side or the demand side issues and constraints related to financial services in the various value chains supported under the project. Moreover, each geographical area is also very diverse. The diagnostic study would map the constraints in the value chains, financial infrastructure, and among financial service providers. It would aim to identify the key constraints and make recommendations to address them in order to improve access to finance. The demand surveys would give an understanding on the levels of access, use and quality of financial services received by the target farmers and their levels of financial capabilities[29]. This would be conducted for the entire state and not just on the project clusters with a representative sample. This would provide a control group as well as provide the state with an understanding on the factors inhibiting the use of formal financial services in the state and thus provide inputs for framing state-wide policies related to formal financial access in the state. Two demand side surveys would be considered one at the base line and the other around the mid-term (around 2012) to understand level of

[29]Financial capability, as defined by the World Bank and in this report, is the capacity to act in one's best financial interest, given socioeconomic and environmental conditions. It encompasses knowledge (literacy), attitudes, skills and behavior of consumers with respect to understanding, selecting, and using financial services, and the ability to access financial services that fit their needs (World Bank 2013d).

achievement (non-achievements) of the targets and the corrective measures to be adopted accordingly TOR for diagnostic survey is provided in *Annexure C-3(a).*

(b) **Implement tailored financial education and counseling program:** A large section of the clients is voluntarily excluded from formal financial services due to the poor knowledge of the products of the banks and capacity to access and use them. The project would therefore facilitate to bring them into the formal financial services network through financial education and counselling. The financial education and counseling activity will be tailored to the needs of the target agricultural households and particularities of the primary value chain around which they are organized. The target clients would be members of the Common Interest Groups (CIGs) promoted by the project. Information on credit reporting and guidance on building a good credit history will be part of the financial education. The financial counseling will be further tailored to the financial situation of the individual households based on information on the household's assets, liabilities, incomes and expenses, and coping mechanism used for meeting their vulnerabilities. The financial education and counselling would be tailored to building up awareness of different financial products as per the different value chains. It would also raise awareness (of the clients) of the financial products, being offered by the different banks and FIs so as to reduce mis-selling, ensure good delivery as per the norms laid down by the banks and FIs. The raised awareness would serve as a feedback loop to ensure effective delivery of banking services. Terms of Reference for hiring an agency for new product development for value chain financing are provided in *Annexure C-3 (b).*

(c) **Support innovative approaches to deliver financial services at scale for the target clients:** The use of innovative approaches to deliver financial services at scale to project beneficiaries will be supported through a Challenge Fund, which will fund competitively selected financial service sub-projects. The call for proposals for the sub-projects will build on the information and insights from the diagnostic studies and demand side surveys, and will focus on the beneficiaries covered under project's prioritized value chains in targeted districts. The sub project proposals are expected to come from financial institutions, value chain financiers, payment service providers, finance infrastructure service providers by themselves or in collaboration with technical service providers and others. Some of the examples of innovative approaches could include credit scoring for particular value chains, modifications/development of financial products around particular value chains and electronic warehouse receipt financing. Approximately 10 sub-projects with an average implementation period of three years each, are proposed to be supported by the project in a phased manner over the project period. Facilitation support will also be provided by service providers/resource agency engaged by the project to develop a call for proposals, conduct outreach among service providers, facilitate selection of proposals through an expert panel, facilitate funding of selected projects through grant agreements between the project and selected entities, monitoring their implementation, and reporting results

In addition to these three activities, the project will also work closely with existing structures such as the State Level Banking Committee and District Level Banking Committees, and the state and district Lead Banks to channel appropriate financial services to project beneficiaries through ongoing financial inclusion activities However, the results from this activity will not be tracked and reported as part of the project's results framework

273. **Estimated Cost:** The total estimated costs of the sub-component will be around 6037.00 lakhs. Break up is briefly shown below. The details are provided the cost table and this excludes the cost of sub-projects *(all costs in Rs. Lakhs).*

Sl	Item of expenditure	2017	2018	2019	2020	2021	2022	2023	Total
1	Staffing	48	48	48	48	48	48	48	336
2	Studies, surveys,	150	-	-	50	-	50	50	300
3	Resource Agency	-	150	150	100	50	60	-	510
4	Financial Education & Counselling	190	375	100	370	370	-	-	1,405
	Total	**388**	**573**	**298**	**568**	**468**	**158**	**98**	**2551**

274. **Implementation Arrangements:** The basic concept of the approach is to provide instruments to banks and non-banks that reduce constraints to develop their own outreach strategy and deliver new/adapted financial products to a clientele composed of mostly farmers but also other players in the value chain in an economically feasible manner. Therefore, the approach taken is more open allowing for ideas and experiences of the all the stakeholders including the banks to be adopted within the project as it goes forward. It would also allow for the banks and non-banks to gauge their comparative advantage in delivering the different products under the project.

275. This sub component would be divided into two phases: Phase I and Phase – II. The first phase would cover a Diagnostic study and the Demand Survey and would be completed within Year1. The inputs of the diagnostic study and the demand survey would be the basis of the formulation of the Financial education and counselling program, and support for innovative financial services in Phase-II.

276. Snapshot of implementation arrangement .

The project would begin with a diagnostic survey to be conducted to understand the constraints in the value chain and in the supply side of the financial services and gaps that need to be mitigated. It would also look into the deficiency in the financial infrastructure in order to improve access to finance	The outputs from the diagnostic and demand survey would serve as an input for both rolling out the sub projects and the building the design for the Financial Education and Counseling intervention that would follow. This part would begin after a Resource Agency is recruited which would invite proposals based on the inputs from the diagnostic study and the demand survey.	10 sub-projects are being proposed to be rolled out under this sub-component through the entire project period. The FE and counseling is proposed to be implemented from Year 2 to Year 4. Some miscellaneous studies would be conducted during this period.	On the mid-term of the project (around 2022) another round of demand survey would be conducted to have get an understanding on improved access to finance on various parameters by the target clients. Accordingly, corrective measures could be initiated.
The demand surveys would be conducted simultaneously either by the same or another agency to give an understanding on the financial needs and uses by the farmer households and their levels of financial capabilities which constrains them from availing formal financial services.			

277. In order to facilitate the rolling out of the activities proposed above, it is suggested that a sub-head be created for recruiting staff. It is proposed to recruit three staff for overseeing and coordination. A senior financial services specialist will be recruited to be stationed in the H.O. Two District level Financial Inclusion specialists will be recruited for the project to be stationed at the

district level. One to be stationed at district level overseeing the districts located in the South Bank of the state and the second to be stationed at the district level overseeing the districts in the North Bank of the state. The recruitment process is to be completed by the middle of the second quarter of 2017. The broad requirements of the Financial Services Specialist are given the *Annex C3 (c).*

278. Based on the diagnostic survey, Phase II will start with designing the financial education and counseling services for farmers and farmer organizations. This capacity development program will be tailored for specific financial requirements of the target groups in priority value chains. The combination of training and counseling over a period of 4-6 months for one cohort of farmers would allow them to digest the learnings and change their financial behavior, which is expected to lead to responsible use of the banking products and services. In order to ensure that the households are not too dependent on the Master Trainer's, the agency would ensure that the households are sufficiently empowered to avail of the services and product of the bank independently before they move to a new cohort. This would ensure the sustainability of this component. Following basic financial education, financial counseling will be provided in a manner that is further tailored to the financial situation of the individual households based on information on the household's assets and liabilities, major sources of incomes and expenses, and risks and coping mechanisms. Particular care would be taken to ensure that the financial education and counselling activity is 'actionable' and for this purpose will be closely linked to financial products and services that are available in reasonable proximity to the target group.

279. A Technical Service Provider would be selected through a competitive bidding process for providing financial education and counselling services. A draft TOR is attached in *Annexure-C3(d).* DLCC would support and monitor the implementation of the scheme at the district level

280. Under the Phase-II, the findings of the diagnostic survey would provide the understanding of the nature of demand for financial services (both for production and consumption) of the clients in the various value chains. The study is expected to provide inputs to look at value chain financing in a comprehensive manner which lead to sound value proposition for the product and identify partners that help manage risks and reduce transaction costs. The project will encourage potential financial service providers to develop product prototypes and outreach strategy tailored to specific client needs and capacities of financial institutions. The outreach strategies will include a roll-out plan of products/services specifying expected portfolio growth in terms of number and volume of the loans/other services by type of client and economic activities/purpose. The project will engage with specialized technical assistance providers which will work with the financial service providers in specific areas including improving cost effective delivery mechanism and developing client centric product development. If required, coordination with other value chain actors will be facilitated by the project. Financial and technical requirements for low-cost delivery mechanisms including the use of mobile platforms and agent banking will be estimated and built into the roll-out plan. The outreach strategy can also include the opening of physical outlets in underserved rural areas within program districts in order to reduce transaction costs and enable direct contact with clients. The entire sub-activity is expected to be taken by a Resource Agency which is selected through a competitive bidding process.

281. Risk and Mitgation Measures

Sl	Activities	Risks	Risks Mitigation Measures
1	Diagnostic study, Demand surveys and Innovative projects	Poor quality of work of studies/innovative projects	Ensuring that the selection is broad based and the contracted Agency has previous experience in conducting such studies
			Ensuring that the contracted Agency has previous experience of conducting such studies
			Ensuring that the team consists of people with competence relevance to the work
			Deliverables in terms of outcomes clearly identified and strictly monitored
		Delay in the delivery of study reports/implementing innovative projects	Ensuring that the selection is broad based and the contracted Agency has previous experience in conducting such studies
			Ensuring that the institution has sufficiently strong financial backing for continuing the study/project for a short period even if there is fund flow problem from the project
			Finances to be released in instalments as per deliverables output
			Deliverables and time schedules with clearly marked out milestones and strictly monitored for adherence
2	Financial Education and Counselling	Beneficiaries not selected properly.	Only members of the Common Interest Group selected as beneficiaries
		The intervention would not address the needs of clients (both beneficiaries and bankers)	Ensuring that the selection is broad based and the contracted Agency has previous experience in conducting such work.
			Only tried and tested model of Financial Education and Literacy would be rolled out. Not scope for innovation
			The training modules should incorporate the product lines of the service providers (banks) existing in the project area.
			Deliverables and time schedules with clearly marked out milestones and strictly monitored for adherence

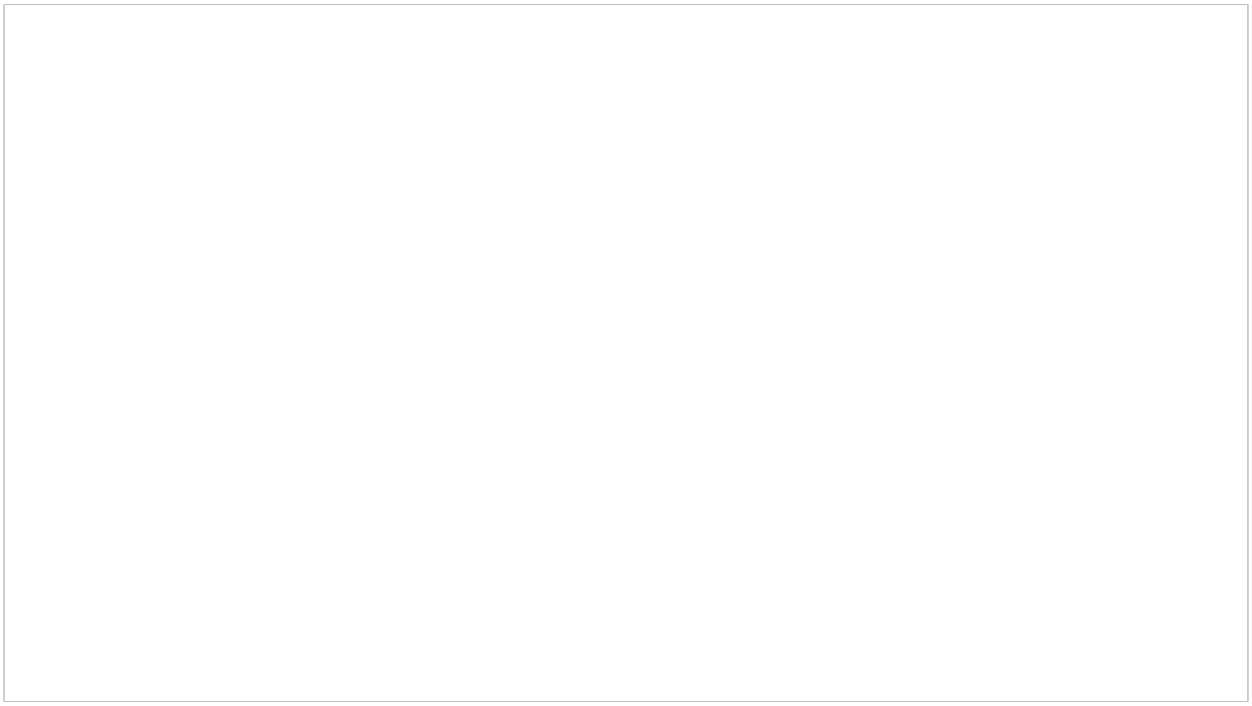
282. Results Chain and Results Framework

(a) Results Chain

Activities	Sub activities	Output	Outcome
Diagnostic study and Demand surveys and small studies	Conduct the diagnostic study for mapping the constraints in the value chain, the Financial Infrastructure, and financial service providers.	Report identifying key constraints and opportunities and recommendations.	Providing inputs, insights for the designing FE and innovation sub-projects
	Two Demand surveys to conducted. The first one at the start of the project which would be the baseline and the second one to be conducted around the middle level of the project to get an understanding on the on the level of achievements under the sub-component. and take corrective measures accordingly.	Report on financial access, use and quality, and, financial capabilities of the target clients.	
	Small studies	Quick and rapid need-based studies to assess implementation performance and make course corrections	
Innovation Sub-projects	Workshop(s) to share findings from the demand-side survey and diagnostic study to potential financial service providers	Innovative financial services and products developed and/or improved, and rolled out to target clients	Clients with increased access to financial services through sub-projects
	Solicit proposals, evaluate and select sub-project Implementing Partners	Key constraints on financial infrastructure and value chains limiting access to finance addressed	
	Implementation of sub projects		
Financial education and counseling	Design and test financial education training and counseling program tailored to the needs of the target group.	Tested program available for roll-out	Increased number of farmers financially aware and being able to use financial services responsibly, and increased use of financial services and products of the banks..
	Implementation of Financial Education and counselling	Program rolled out to target clients	

(b) **Results Framework**

Indicator Name	Baseline	Cumulative Target Values						
		YR1	YR2	YR3	YR4	YR5	YR6	End Target
Producers provided with financial education/ counseling (		2500	10000	30000	70000	150000	200000	250000
% of FE clients with increased savings amount				10%	20%	30%	40%	75%
% of FE clients using credit services				5%	10%	15%	20%	50%
% of FE borrowers with 100% repayment				50%	75%	80%	85%	90%
% of FE clients using more than one service				10%	25%	40%	55%	85%
% of FE clients using insurance				10%	15%	20%	25%	30%
No. of beneficiaries with increased access to financial services through sub-projects (30% female)			5000	15000	35000	75000	100000	125000



Component D: Project Management, Monitoring and Learning

283. Component D: Project Management, Monitoring and Learning: This component will ensure effective implementation of the project activities, and monitor and evaluate project implementation progress, outputs and outcomes, building on implementation experience of AACP. The component will support: (i) establishment and operations of a Project Coordination Unit (PCU), which will oversee and coordinate activities of the implementing agencies of the project; (ii) establishment and operations of Project Implementation Units (PIUs) in the respective implementing agencies; and (iii) setting up a monitoring and evaluation (M&E) system, including a project management information system (PMIS), and contracting an external M&E agency to monitor project activities and impact. This component will also finance dedicated staffing for the project activities, consultancies, training and related material, office equipment, and incremental operational costs. The Project will provide investment and technical support for the establishment of a sound PMIS and information and communication technology (ICT) systems and capacity strengthening of key personnel.

Project Coordination and Implementation

284. Implementation Arrangement: The Assam Rural Infrastructure and Agricultural Services Society (ARIASS) formed in November 1998, as an autonomous body under the Government of Assam (GoA) was the monitoring & coordinating agency for AACP. The Society is headed by the Chief Secretary, GoA, as its President (Project Guidance Council) and the Agriculture Production Commissioner, GoA is the Chairman (Governing Body). The Project Coordination Unit (PCU) is the head quarter of the Society, which is headed by a State Project Director. GoA has decided that the ARIAS Society will be the monitoring & coordinating agency for APART.

285. Setting up of Core Project Implementation Units (CPIU) at the Secretariat level: Total 8 CPIUs in each of the eight line departments of APART, headed by Senior most secretaries of the concerned Departments is being notified by the concerned Admin. Deptts. A Joint Secy./Deputy Secy. level officer in each CPIU will be the Coordinator. The operational and other expenses of the CPIU including for one MIS Operator and one technical staff hired on contract basis will be supported under the project. The CPIU will monitor & coordinate the project activities. This arrangement is considering the fact that during AACP, the ownership acquaintance of the project was low in the Admin. deptts. Total 8 core PIUs will have to be notified by the following line Deptts. of APART at Secretariat, Dispur:

(a) Department of Industries and Commerce
(b) Department of Agriculture
(c) Department of Fisheries
(d) Animal Husbandry and Veterinary Department
(e) Department of Cooperation
(f) Department of PWRD
(g) Department of Sericulture, Handloom and Textiles
(h) Department of Panchayats and Rural Development

286. Composition of Core PIU: The Composition of each Core PIU will be

a. Senior most Secretary of the Department will be the head of the CPIU

b. A Joint Secretary/Deputy Secretary (from Govt.) will be the Coordinating Officer

c. One MIS Operator and One Technical Staff (both may be hired on contract, if not available within the Deptt. and remuneration would be paid from APART).

287. Terms of Reference in brief: The CPIU will –

(a) be mainly responsible for coordination and linkages at/from secretariat level with the operational PIUs and the PCU;

(b) extend close cooperation to the PCU of ARIAS Society

(c) endorse the Annual Work Plan (AWP) prepared by the concerned OPIUs and send to the PCU for approval by the ARIAS Society;

(d) ensure that there is no duplicity with other schemes;

(e) ensure that there is no conflict in implementation modalities of other similar schemes vis-à-vis that of APART

(f) facilitate convergence of other schemes with APART wherever possible;

(g) will review the project implementation (including Physical & financial) on monthly basis linked to the AWP (before 10th of every month);

(h) The CPIU, if required, may held the review meetings through video conferencing facilities of the NIC at the Secretariat and District level;

(i) The CPIU will forward the minutes of the monthly meeting to the PCU for needful

(j) take corrective measures for removal of impediments and for expediting progress

(k) liaise with the DLCC/DCs for removal of any hindrance during execution of the project

(l) Validate the physical progress reports and send the same to PCU for triangulation.

(m) The incremental operational expenses of the CPIU including remuneration of the contractual staff will be borne under APART

288. Setting up of Operational PIU (OPIUs) at the Directorate/HOD level: Total 15 OPIUs are required to be notified in the Directorate/HQ of each of the implementing line Deptts/agencies. The OPIUs will be headed by the concerned HOD and one designated Nodal Officer in each OPIU will be responsible for day-to-day coordinating with the CPIU, PCU, DLCC etc. The operational and other expenses of the OPIU will be supported under the project including for staff hired on contract basis (e.g. technical, procurement, accounts, social, environmental, MIS etc. as per need and agreed with the W. Bank).

289. The following operational PIUs will be set up

CPIUs in the Administrative Deptt.	Operational PIUs in Commissionerates/Directorates/HODs/HQ of Agencies
1. Agriculture Department	1. Directorate of Agriculture
	2. Directorate of Horticulture & Food Processing
	3. HQ of Assam State Marketing Board (ASAMB)
	4. HQ of Assam Agricultural University (AAU)
2. Industries & Commerce Deptt.	5. Commissionerate of Industries & Commerce
3. Animal Husbandry & Veterinary Department	6. Directorate of Animal Husbandry & Veterinary
	7. Directorate of Dairy Development
	8. HQ of Assam Livestock & Poultry Corporation Ltd (ALPCO)
4. Cooperation Department	9. HQ of West Assam Milk Union Limited (WAMUL)
	10. HQ of Assam State Warehousing Corporation (ASWC)
5. Fisheries	11. Directorate of Fisheries
6. Handloom, Text. & Sericulture	12. Directorate of Sericulture
	13. Directorate of Handloom & Textiles
7. Public Works Roads Deptt.(PWRD)	14. Chief Engineer (World Bank aided Projects), PWRD
8. Panchayat & Rural Development	15. Commissionerate of Panchayat & Rural Development

290. Indicative composition of OPIU will be as follows

i) Commissioner/Director/Chief Engineer/MD/CEO (as the case may be)
ii) Nodal Officer (from the concerned Directorate/Commissionerate/Agency) (not contractual)
iii) Alternate Nodal Officer (from the concerned Directorate/Commissionerate/Agency) (not contractual)
iv) Accounts Officer (1)
v) Procurement Specialist (1)
vi) Social Sector Specialist (1)
vii) Environment Specialist (1)
viii) MIS Operator (1)
ix) Functional/Technical Specialists (1)
x) Office support (3)

Note: Professionals for positions (iv) to (x) may be hired on contract basis from market, if not available within the Directorate/ Commissionerate/ Agency

291. Terms of Reference of OPIU

(a) implementation of the concerned project component and overseeing & monitoring the implementation of the department specific activities through their district/field level offices and identifying corrective actions;

(b) preparation of the Annual Work Plan, consistent with the Project Development Objectives and Project Appraisal Document (PAD);

(c) management, co-ordination and technical support for implementation of sub-project activities

(d) Preparation of progress reports, including QPRs and Utilisation Certificates for the funds released

(e) managing the service providers and external experts relating to the PIU for implementation of project activities

(f) planning and design of innovative sub-projects

(g) disseminating the success stories and lessons learnt from the successful projects

(h) arranging for training workshops on effective implementation of the Projects

(i) developing close linkages and network among the different project stakeholder agencies

(j) submitting Sanction and Fund Release proposals to the PCU

(k) overall procurement planning, implementation, procurement oversight and supervision and responsible for meeting project's compliance with procurement methods / procedures as agreed with W. Bank;

(l) documenting success stories;

(m) providing monthly reports to the PCU as per the format to be made available by the ARIASS;

(n) collecting update data on the input/output indicators and consolidating and analyzing the data provided by District officers;

(o) responsible for preparing, implementing and monitoring their respective annual action plans;

(p) responsible for monitoring of the implementation of the individual activities of the sub-component within the purview of the respective departments;

(q) recommending personnel from Commissionerate/ Directorate/Agency for training and capacity building programs under APART

Note: The Nodal Officer of the respective OPIs will coordinate between PCU and Directorate/ Commissionerate/ Agency. OPIUs will be an accounting centre and funds will flow from ARIASS to OPIU for its operational expenses

292. District Level Coordination Committees: The District Level Coordination Committees (DLCCs) to be formed under APART in all the 16 (undivided as of 1st April'2016) prioritized districts will be primarily responsible monitoring & coordination of project activities in the District and resolving any local issues, and duplicity with other schemes. The committee will act as a district focal point for all the project activities in the districts. The DLCC will be headed by Deputy Commissioner (DC) of the concerned district, with the Addl. Deputy Commissioner (ADC) (Development) as its Member Secretary. All the heads of district level implementing deptts./agencies, representative of the lead commercial banks in the district, local chambers of commerce will be its members. The DLCC may also include representatives of the FPOs and Industry Associations (I.A.) as special invitees, if required

293. Composition of DLCC: The incremental operational expenses of DLCC including for the following contractual staff will be supported under APART

(a) District Accounts Manager
(b) MIS Expert
(c) Coordinating support staff
(d) Other manpower as required from time to time

294. Terms of reference of DLCC: The DLCC will be responsible for

(a) Coordination, monitoring & management of the Project activities at the district level;
(b) facilitating the project staff, NGOs and communities in implementation and management of the activities;
(c) ensuring that the participant selection criteria are adhered to consistently by all the implementing agencies;
(d) facilitating/organizing (cross-cutting) training programmes, PRA, awareness camps, workshops, seminars etc.
(e) coordinating all activities cutting across sectors/disciplines (e.g. training and capacity building programs)
(f) hold regular monthly meeting for reviewing and pursuing the project activities as per the Annual Work Plan, follow up of action taken report against the decision previous meeting;
(g) constitute need based sub committees for efficient management and implementation of project activities;
(h) recommending a shortlist of NGOs to the State Project Coordination Committee (SPCC) headed by the SPD, ARIASS for engagement as district NGO (if required to hire non-government partners under APART); and evaluating performance of NGOs (if hired under APART) and take appropriate measures to address the shortcoming, if any;
(i) facilitate dissemination of project information , particularly amongst the stakeholders
(j) identification of issues hindering the project implementation and take suitable/amicable mitigating measures or refer to the SPCC for corrective measures;
(k) coordinating & liaison with the PCU/SPCC, OPIS, CPIU and other stakeholders of the project;

(l) monitor compliance of project implementation pursuant to the laws/acts of the Government such as Fish Seed Act, Resettlement & Rehabilitation (R&R) Policy;

(m) uploading the data (e.g. physical, financial, outcome, output, etc.) for the PMIS system by 15th of next month;

(n) collating monthly accounts of all the district level agencies and submission to the PCU, ARIASS along with reimbursement claims, with copy to the concerned HODs,

(o) ensuring avoidance of duplicity of project activities with other schemes

(p) convergence of complementary activities at micro level (e.g. financial services to the entrepreneurs, etc.).

Note: The DLCC will be housed in the office of DC as far as possible. Basic office amenities like photocopier, computers, minimum furniture, hired vehicle, email facility etc will be provided by APART

295. Responsibilities of the District level offices of the implementing departments

(a) implementation of the assigned project activities at the ground level

(b) achievement of physical and financial milestones;

(c) quality assurance; and

(d) working closely with producer communities and entrepreneurs to achieve the project development objectives

Note-1: District working team will be headed by concerned District level officer with need based support staff hired on contract as agreed with World Bank

Note-2: The incremental operational and other expenses of these offices (including for manpower as per need and agreed with the World Bank) will be supported under the project.

Monitoring and Evaluation

296. Background: The Monitoring and Evaluation (M&E) represents a core component in the implementation of the project. Given the crosscutting and interconnected nature of the project, the project team has proactively engaged in the development of the M&E framework which will be used to inform physical progress and financial disbursement; develop a project baseline to review project implementation; to measure outcomes and impacts aligned to the project development objectives

297. M&E Cell: Given the nature of the project, the project team will establish an M&E cell at the Project Coordination Unit (PCU). The PCU will be focused on supporting the implementation of the M&E structures across APART (e.g. standardized guidelines, processes and workflows) to allow Project Implementing Units (PIUs) to monitor and report on the project's physical progress and financial disbursements. This will be complemented and supported by an external M&E consultancy firm, which will conduct the baseline survey for the project (within 6 months of the commencement of the program) alongside six monthly process studies and impact evaluations at identified milestones (midterm and end of project). The process studies will provide the program a mechanism to rapidly identify areas in implementation requiring course correction in advance of the mid-term review to inform adjustments in operational design and align with the strategic objectives as outlined in the PDO

298. Institutional Structures & Responsibilities of M&E in APART:

(a) **APART (PCU)**: A PCU headed by the State Project Director has been established with the operational responsibility for planning and coordinating all M&E activities. This includes: (a) defining and monitoring the implementation arrangements of M&E across the project including operational guidelines, workflows and processes; (b) conducting the aggregation, harmonization and analysis to

monitor key performance indicators across the program, extending from progress to outcome indicators; (c) to provide inputs to inform adjustments in operational design; (d) to provide capacity building support to PIUs alongside (e) in-field support to monitor implementation and outputs of selected project activities; (f) to document through formal technical notes including case studies lessons drawn from the program to further inform the operationalization and implementation of the project; (g) to publish six-monthly progress reports for review by officials alongside development partners to monitor and report on the project's physical progress and financial disbursements alongside KPIs compared to baseline targets and overall project objectives.

(b) **APART PIUs:** The project has identified and assigned nodal officers in each PIU to be responsible for monitoring the implementation of the activities under each sub-component assigned to the respective department. Through the project, information captured will be cascaded from the block to district office, aligning to the overall implementation structure of the project, with the PIU consolidating, reviewing and analyzing the data reported.

(c) **External M&E Agency:** The PCU will be complemented and supported by an external M&E consultancy firm, which will conduct the baseline survey for the project (within 6 months of the commencement of the program) alongside six monthly process monitoring studies and impact evaluation at identified milestones (midterm and end of project). The process studies will provide the program a mechanism to rapidly identify areas in implementation requiring course correction in advance of the mid-term review to inform adjustments in operational design and align with the strategic objectives as outlined in the PDO.

Specifically, the external M&E consultancy has been contracted to (a) to conduct the baseline and as set of process evaluations to review the operationalization of the implementation arrangements through a focused lens in terms benchmarking the project to the overall project's objective; (b) deliver six-monthly independent M&E reports to the PCU providing insights to cross-cutting implementation issues alongside recommendations; (c) provide technical support in developing a management information system (MIS) for the project within 18 months of project implementation; alongside (d) strengthening the capacity of the PIUs to monitor project impacts and adoption of the MIS

299. Conducting the M&E:

(a) **Baseline Survey**

(i) **Sampling Strategy and Survey Design:** The M&E consultancy will prepare a proposed sampling strategy including the proposed methodology, design and sample frame. This will be the basis for discussion, collaboration and finalization with both PCU alongside development partners, with guidance to be provided by independent IE evaluators. This will be followed by the survey questionnaire, following international best-practices, including pre-post-field-testing, pilot review/field validation

(ii) **Data Sources:** The M&E consultancy will prepare a proposed sampling strategy including the proposed methodology, design and sample frame. This will be the basis for discussion, collaboration and finalization with both PCU alongside development partners, with guidance to be provided by independent IE evaluators. This will be followed by the survey questionnaire, following international best-practices, including pre-post-field-testing, pilot review/field validation

(iii) **Control & Non Control Groups:** The PCU alongside the M&E consultancy will adhere to international best practices in conducting IE with control and non-control groups, specifically assigning controls to ensure meaningful comparison of treatment and non-treatment groups. The PIP through PCU will review and advise on the controls as defined by the independent consultancy including reviewing propensity scores, or other matching methods, will need to be used to assess the validity of the controls in the analysis of the baseline data

(iv) **ToR for Baseline Review:** The PCU has finalized the terms of reference for the baseline review outlining specific tasks related to the baseline survey including-

- Development of an appropriate sample design (this will include developing the sampling methodology, sampling stages & strata, the sample frames and the system for selecting the sampling units);
- Development and finalization of the baseline survey questionnaires;
- Field testing the questionnaires;
- Incorporating revisions to the questionnaire after field testing the questionnaires;
- Hiring and training the field supervisors and enumerators;
- Planning the field work logistics;
- Conducting a pilot survey and revise the questionnaire based on the findings of the pilot survey;
- Preparing a survey implementation and questionnaire documentation;
- Supervising a survey implementation and ensuring quality control;
- Developing the data entry program, supervising the project database and arrange for data cleaning and entry
- Analyzing and reporting the findings of the survey and provide datasets and final documentation.

(b) **Six Monthly Monitoring Studies:** The PCU will oversee the M&E consultancy in conducting six-monthly independent progress monitoring surveys incorporating-

(i) Up-to-date physical and financial expenditure data compared to annual and end-project targets

(ii) Comparison of project performance vis-a-vis the Annual and End-Project Targets including Output, Intermediate and Outcome indicators with respect to the Baseline values

(iii) Successes and project implementation hindrances/problems encountered during the reporting period with suggestions for remedial actions

(iv) Summary of social impacts due to the Project intervention

300. M&E Reviews: There will be two major reviews to be carried out by the project team through a third-party M&E agency for the review of the PCU alongside development partner. This will be initiated at 2 periods across the project:

(a) **Mid Term Review:** Mid Term Review is primarily a monitoring tool to identify challenges and outline corrective actions to ensure that a project is on track to achieve maximum results by its completion. The MTR would include an impact assessment of the project to date, and also focus on procedures, implementation processes and recommend adjustments in the project design and / or implementation arrangements to overcome identified bottlenecks

(b) **End Term Assessment:** The second major impact evaluation, the End Term Assessment (ETA) would be a comprehensive overall impact assessment including quantitative and qualitative assessment of progress against project development objectives. This will be undertaken at the end of the project with the goal of assessing project performance and determining the outcomes and impacts stemming from the project. The ETA would provide judgments on actual and potential project impacts, their sustainability and the operational efficiency of implementation. The ETA would also identify lessons of operational relevance for future project formulation and implementation.

301. **Fieldwork Progress Reports**: The M&E Specialist of the project team in the PCU will prepare a bi-monthly fieldwork progress report for the project team. The report will include the implementation progress of the project including physical and financial alongside documenting activities including supervision reports pertaining to the third-party M&E agency in conducting their assignment, including progress, challenges, and early findings. This will be complemented by field reports through a set of audits - both internal and external audits -for activities under the project across the range of scales and mechanisms of implementation.

302. **Results Chain and Results Framework**: The Results Chain for APART has been extensively iterated for each component and sub-component pertaining to the projects interventions. Each results chain details the activities, sub-activities alongside expected outputs and outcomes arranged in logical order, demonstrating how each proposed intervention will lead to the achievement of overall project development objectives. Importantly, there is an accompanying set of progress indicators, which provides the basis for measuring the outputs/outcomes including both quantitative and qualitative measures. These results chains, to the extent possible, are also connected to the global Sustainable Development Goals; particularly around project interventions focused on climate change/resilience, female participation and financial inclusion.

303. **Management Information System (MIS):** Through Year-1 of implementation, PCU will establish the structures for M&E including detailed guidelines, workflows and processes for data collection, capture and analysis. The project will in parallel in Y1develop a lightweight and scalable MIS web-based platform adopting both online as well as offline mechanisms of reporting from the Block to the State, aligned to the implementation structure of the project. The MIS will, it is envisaged, streamline the reporting of data/reports from the PIUs (District) to the PCU (State). The MIS will also serve as a citizen engagement platform including as an interface to the public as a project website providing quarterly updates on activities supported by the project alongside a suite of online mechanisms to enable beneficiaries to report any issues encountered under the program through a Grievance Readdress System (GRS). PCU/ARIASS through the M&E consultancy will obtain advisory support for the M&E component to inform the design of the MIS. A separate third-party firm will be on-boarded to develop the platform, with the M&E consultancy also provide supervision, oversight and approval.

Project Management Information System (PMIS)

304. Given the nature of the project and the breadth of interventions across both space and time capturing, generating and analyzing near real-time information from across all components and geographies (e.g., Cluster, District and State) of the project will be critical to supporting real-time management of all facets of the project. Specifically – the APART PMIS will support project management focused on tracking physical and financial progress across all components; support informed decision making through an integrated GIS providing a spatial lens for planning; an instrument for oversight and review; as well as capturing information required for evaluating medium to long-term impact based on a defined set of parameters and performance metrics.

To this end – the APART PMIS will become a central platform to serve the core functions of the project - providing the right information to the right set of people at the right time to enable adaptive project management and decision support. Importantly, the PMIS will also serve as a platform for citizen engagement including as an interface to the public as a project website providing updates on activities supported by the project alongside a suite of online mechanisms to enable beneficiaries to report any issues encountered under the program through a Grievance Redressal Mechanism (GRM)

305. The primary activities include

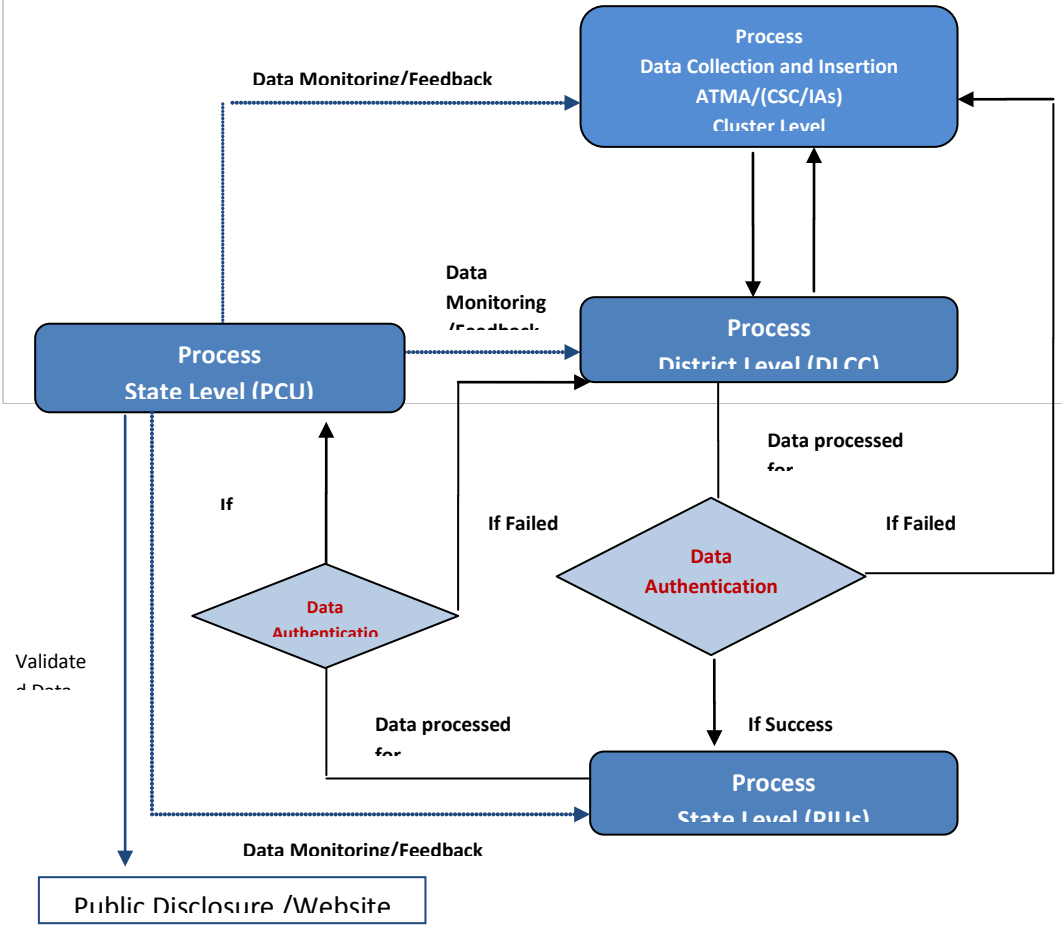
(a) **Development of a PMIS:** This will include the development of a lightweight online platform to serve the purpose of the project while considering IT infrastructure and enabling

environment constraints (e.g. power, institutional capacity) in the project area. To this end – the PMIS will combine both online and offline mechanisms and modalities with procedures and processes to ensure the collection of data/information across all components and geographies under the purview of the project. The system architecture, information design, workflow and user-interaction will be structured to support the flow of information across the project while ensuring key functions pertaining to support decision making are embedded into the rubric of the platform (e.g. analytics, automated reports, visualizations through spatial decision support systems, integrated geo-tagging to support monitoring of physical assets; data control, quality management, access control and security).

(b) **Procedures and Process for PMIS:** Effective implementation of the PMIS will require a multi-mode approach combining both online and offline mechanisms for information capture and flow. To this end – the project will develop specialized forms/ledgers for data capture across all components of the project related to the overarching results framework for information capture at the project/cluster level consolidated and digitized in the PMIS as information flows to the district/state level. APART has assigned MIS personnel across the program at all geographies and across all spheres of intervention to support in the capture, transmission and analysis of project data and information.

(c) **Phased Deployment:** The PMIS will undergo a phased deployment with pilots conducted in several locations covering various aspects and components of the project. The PMIS will be developed using an agile methodology where functions will be introduced in phases to monitor/cross check system deployment. The system will then be scaled-up and deployed in all locations for the full functionality envisaged. Appropriate phasing-in/backup procedures will be designed and employed to ensure continuity in roll-out

306. Data flow diagram for MIS



307. APART will engage a third-party firm (system integrator) to develop and deploy the PMIS. To ensure successful implementation APART has also engaged a third-party M&E consultancy firm to provide technical advisory services and oversights to (a) conceptualize, design and outline the technical specifications and RFP for the PMIS; alongside (b) monitoring the performance of the system integrator; and (d) helping to build capacity and enable knowledge transfer from system integrator; as well as (e) prepare the final impact assessment report.

308. Guiding Principles of PMIS Design:

In order to make MIS a useful tool of performance monitoring, the following key principles are expected to be adopted in the development of MIS for the APART.

i. The computer-based information sub-system at the Project Coordination Unit would answer state level needs for information to improve project management. This sub-system could mainly be a consolidation module as almost all the actual data entry and implementation tracking is expected to be done at the district and cluster level.

ii. Information needs and indicators to capture information for the project, the format and presentation style of the web page are to be identified in a participatory manner involving the key stakeholders of the project (the client) and the MIS consultant.

iii. The potential users of information understand the utility of MIS and their role in collection, recording, transmission and use of information;

iv. The system provides for a two way flow of information, such that those who collect and transmit the information receive the feedback and the information flow synchronizes with the organizational structure;

v. The MIS design should ensure that it does not impose a high work load at any level in the organization and at the same time there is no information/data 'overload' at any level. The design should be intelligent to minimize data entry during routine use (e.g. drawing upon lists, dynamic menus/options, avoiding repetitive and unnecessary entries, etc.).

vi. The system is flexible enough to accommodate internal learning changes in future.

vii. Develop test procedures for the developed MIS software, which must also include procedures for the overall modular software testing (acceptance). The MIS should be fully tested (at the program level, sub-system level and the overall MIS level) for all functionality before its acceptance by APART. The testing should ensure that the MIS linkages between the districts and the PCU work correctly.

viii. Prepare documentation (A comprehensive technical manual) that will be used for the maintenance of the system. The documentation will also be used as technical reference manual for IT staffs. Develop user guides to go with the system (covering all the sub systems at Cluster/Block/ District and PCU levels).

ix. Designed to focus on information on empowerment of the poor, income security and quality of service standards, project components and sub components which would include but not be limited to various aspects of institutional strengthening, livelihoods, project monitoring, learning and evaluation, communication, dissemination of information and disclosure, transparency, accountability and governance, finance, procurement etc.

Environment Management

309. The sub-project interventions under the production and post harvest segments are likely to have negative impacts on the environment as indicated below:

- The civil works pertaining to upgradation of ware houses, market yards, rural roads and construction of common service centres are likely to pose risks during citing, construction and operation.
- The productivity enhancement interventions in agriculture may have impact on biodiversity, water resources and might trigger enhanced use of agro chemicals.
- The processing interventions in the value chains may lead to high energy use and release of organic wastes including harmful microbes.
- The livestock interventions may lead to pressure on fodder and water resources and may pose risks due to improper manure management
- The fisheries interventions may put pressure on beels

310. Based on the possible impacts of the proposed interventions, the project is classified as Environmental Category "B" as per World Bank Safeguard Policies as only moderate impacts are envisaged. Consequently the safeguard policies OP 4.01 (Environmental Assessment), OP 4.04 (Natural Habitats) and OP 4.09 (Pest Management) are triggered.

311. As per the requirement of OP 4.01 and Environmental Assessment study is conducted to comply the applicable 'legal and regulatory framework' for the project interventions, to understand the potential negative impacts on the environment and to propose the mitigation measures.

312. Based on the assessment an Environmental Management Framework has been prepared to guide the ARIAS Society and Respective PIUs/Line Departments under the project, in integration of environmental considerations into subproject preparations (PIP, DPRs, Business Plans etc.), screening and categorization, environmental appraisal, and preparation and implementation, monitoring, of Environment Management Plans (EMP) for sub projects to comply with legal and regulatory requirements and to mitigate the negative impacts while enhancing the positive impacts. The Environmental Management Framework (EMF) lays out a system of environmental appraisal for all the business proposals/plans and prepare Environmental Management Plans for all subprojects as per the need. EMF provides for the following for ensuring the environmental management of the sub project interventions-

- A negative list of activities that are not to be invested in under the project components
- Guidelines for inclusion of environment management guidelines/best practices into the sub-project proposals (DPRs, business plans etc.)
- Process of environmental appraisal of different project interventions
- Templates/formats/checklists for environmental appraisal of the sub-projects
- Mitigation measures/clauses to be included in the bid document
- A pest management plan
- An aquatic management plan
- Institutional arrangements
- Capacity building plan
- Monitoring plan

Negative list: The negative list largely draws from legal and regulatory framework and World Bank safeguard policies. The sub-project proposals will be screened for inclusion of any activities udder this list. Any such activities will be dropped.

313. Environment Management Plan: The purpose of the Environmental Management Plan (EMP) is to outline the mitigation, monitoring and administrative measures to be taken during project implementation to avoid or mitigate negative environmental impacts. The EMP identifies feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The plan includes compensatory measures if mitigation measures are not feasible, cost-effective, or sufficient. Specifically, the EMP

(a) Identifies and summarizes all anticipated significant adverse environmental impacts

(b) It proposes mitigation measures and describes along with technical details each mitigation measure

314. Pest Management Plan: The production interventions may stimulate greater use of agro-chemicals associated with more intensive cultivation and/ or higher crop value. The objective of EMF in this regard is to encourage adoption of Integrated Pest Management (IPM) approach and increase beneficiaries' awareness on pesticide-related hazards and good practices for safer pesticide usage, use of organic inputs including bio-control agents as well as to provide relevant training and information dissemination activities

315. Capacity Building Plan: Capacity Building Plan suggests the capacity building needs, content, methodology and time plan for project teams, line departments and the beneficiaries

316. Monitoring Plan: Supervision, monitoring and auditing requirement has been suggested in the EMF to assess the efficacy and efficiency of the proposed system for environment management. Indicators for evaluation have been developed to ascertain the sustainability of the subproject interventions. For evaluation of implementation, an external audit mechanism is planned

317. Executing & Implementing Arrangements:

(a) The project will be implemented by the Project Coordination Unit (PCU)/ Project Management Unit (PMU), which will be headed by State Project Director (ARIAS Society). The PMU shall have two Environmental Specialists (Agriculture/Livestock and Engineering) who will be responsible for overall Implementation of EMF.

(b) For sector wise project Interventions**,** Project Implementation Units (PIUs) shall be in place which will designate one 'nodal officer' who will take up the responsibility of facilitating the implementation of EMF.

(c) Further at District Level Coordination Committee (DLCC) level there will be 3 sector environment specialists each on Agriculture, Livestock, Fisheries, Civil works and Processing handling the responsibilities of 5 districts each. They will ensure the integration of EMPs/best practices in to the sub-project proposals (DPRs, Business plans etc.) and will appraise and monitor the subprojects

318. Budget: The tentative budget for implementation of EMF is as follows-

Head	Details	Cost Estimate	Integrated into overall project costs
Human Resource			
Env. Specialist (PMU) – Engg	I ES (Engineer) for 7 years	1,00,00,000	
Env. Specialist (PMU)- Agri & livestock	I ES (Agri & livestock) for 7 years	1,00,00,000	
District Level sector Env. Specialists (Agri - 3 nos Livestock - 3 nos Fisheries - 3 nos Civil works - 3 nos Processing Plant (Pork, Dairy, fish) - 3 nos)	15 Env. Specialists (3 per sector)for 7 years	6,30,00,000	

Head	Details	Cost Estimate	Integrated into overall project costs
Capacity Building			
Capacity Building – Staff			
State level Capacity Building for Nodal persons (PIU, DLCCs)	1 main training (for 40 trainees)	2,00,000.00	
	6 refresher trainings @ 1,00,000 per training	6,00,000.00	
Field Engineers (140) 3 batches	2 training during project period @ 1 lakh each	6,00,000.00	
Beneficiary trainings	50,000 per FPO for 90 FPOs	15,00,000.00	
Trainings to FPO			
Training to DCSs	L.S @ 2 lakhs (budget shall be included in the DCS project cost)		200000
Env Safeguard Training program for Warehouse (Nodal Engineers preparing DPR)	2 trainings (initial and midterm)@ 1 lakh each	2,00,000.00	
Env Safeguard Training program for PWD (Roads)	2 training at district level (16) @ 1 lakh each	32,00,000.00	
Env Safeguard Training Program for Market yards (100 nos)	2 training at State level in 3 batches @ 2 lakhs each	12,00,000.00	
Env Safeguard Training Program for CSC (100 nos)	2 training at State level in 3 batches @ 2 lakhs each	12,00,000.00	
IEC material	Agriculture Posters	2,00,00,000.00	
	Ware houses	4,00,000.00	
	Markets	5,00,000.00	
	Posters for enterprises	5,00,000.00	
	Handbook for enterprises (2000 copies)	1,00,000.00	
Monitoring			
Monitoring by nodal persons @ PIU	1 visit per year in 16 districts	2,00,000.00	
Visits by Env. Specialist	1 visit per district per year	2,00,000.00	
Monitoring by Sector wise Env. Specialist	at 5000 per visit to 16 project districts	1,00,00,000.00	
External audit	2 audits during the project period @ 25,00,000	50,00,000.00	
Consultancy services – depending on the need		20,00,000.00	
Baseline monitoring (indicators) soil, water		10,00,000.00	
Green Interventions			
Solar panel provision for 100 Market and 40 warehouse	L.S 10Crores		100000000
Total		**13,16,00,000.00**	100200000

Negative list: The negative list largely draws from legal and regulatory framework and World Bank safeguard policies. The sub-project proposals will be screened for inclusion of any activities udder this list. Any such activities will be dropped.

Social Management

319. Social safeguards ensure that social issues are evaluated in preparation of "Assam Project for Agribusiness and Rural Transformation (APART)", help reduce and manage the social risks associated with APART, and provide a mechanism for consultation and disclosure of information.

320. As part of project preparation, Social Assessment has been undertaken to ensure that the potential social issues and risks for APART are identified. Based on the assessment, Social Management Framework has been prepared to address social risks and enhance benefits that build on the principles of social inclusion, participation, transparency, accountability and land requirement. It will ensure that the implementation of the project is in compliance with the operational policies of World Bank – Indigenous people (OP/BP 4.10) and Involuntary Resettlement (OP 4.12).

321. Social development plan of APART is designed to include the measures for gender equity and will focus on the 5th Goal of Sustainable Development Goals (SDGs) which is to "Achieve Gender Equality and empower all girls and women". One of the target of this goal is to "Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate." Women are mostly involved in unpaid work, be it in the garden, in the field or in the household. Hence, official statistics insufficiently represent women's actual share in agricultural work.

322. Specific objectives of this sub-component are: i) To ensure that the sub projects are socially sound and sustainable; ii) To ensure social inclusion, participation and transparency in the implementation of various project components; iii) Creating opportunities for women and marginalized communities; iv) Setting up of Grievance Redressal Mechanism and incorporating citizen's feedback. And v) Adherence to the Social Safeguard Measures as laid down in Social Management Framework.

323. Social Management Framework (SMF): The framework will be applied to all sub-projects in different stages of the project cycle. It will also incorporate key issues pertaining to participation, inclusion, transparency, tribal development, capacity building and institutional arrangement. The framework also includes screening process for land use and monitoring measures. The different elements of SMF are:

- Resettlement Policy Framework.
- Indigenous Peoples/Tribal Development Plan.
- Consultation and Communication Framework.
- Gender Action Plan.
- Capacity building plan.
- Scheme cycle for each sector.
- Grievance Redressal Mechanism
- Citizen Feedback System.
- Social Audit Mechanism.
- Monitoring indicators on social development outcome.
- Reporting formats for quarterly progress reports including tracking of grievances.
- Monitoring and evaluation mechanism to access social development outcomes.
- Assessment and mitigation measures for health and safety issues of the workforce and community as well as compliance with national labour laws and World Bank Group Environment, Health and Safety Guidelines covering the issues related to HIV/AIDS and other communicable diseases.

324. Social Management Activities in various stages of the project: The details of Social Management activities and expected outcomes in the different stages of project are described below:

Stages	Social Management Activities	Outcome
Pre-planning	Selection of cluster villages for specific commodities	List of villages to be covered in the project.
	Selection of markets and warehouses for infrastructural upgradation.	List of selected markets and warehouses available for conducting survey during social assessment.
	Conducting social assessment.	Preparation of Social Management Framework.
	Disclosure of Social Assessment report and Social Management Framework.	Strategies for incorporating social development principles in designing of the project.
	Di-segregation of data in various studies of sub-project.	Baseline data on participation and inclusion in different sub-projects.
	Developing strategy in the sub-projects for facilitating participation and inclusion of women, marginalized communities and indigenous people.	Sub-project plan for inclusion of women, marginalized communities and indigenous people in value chains of selected agri-commodities.
	Designing the institutional arrangement for enhancing positive social impacts of the projects.	Institutional arrangements of Social Management Unit.
Planning	Baseline data collection on social indicators and creation of database.	Detailed baseline data of sub-projects on social indicators.

Stages	Social Management Activities	Outcome
	Identification of various stakeholders in sub-project plans of each sector.	Preparation of plan for support and participation of stakeholders in sub-projects.
	Consultation with stakeholders.	Sharing information about the project components and building consensus for their participation. Assessing the gaps in skill for preparing capacity building plan.
	Conduct due diligence of land use for infrastructural upgradation.	Assessing the title holder of land.
	Preparation of sub-project implementation plan.	Sub project plan in compliance with safeguard measures.
Implementation	Monitoring of sub project implementation.	Adherence of sub-project implementation with SMF.
	Involvement of local people in construction activities.	Indirect benefits for local people.
	Display of the project information in the project sites	Transparency about the project activities
	Regular review and discussion on site specific issues. Conducting regular site visits.	Progress report on social development.
Operation	Representation of women and marginalized communities in decision making bodies.	Inclusion of women and disadvantaged section of society in policy decisions.
	Monitor key social indicators during the course of operations.	Completion of sub-project activities in conformity with SMF.
	Document key learnings.	Incorporate the same for future sub-projects.

325. Social Management Unit (SMU): Intensive social mobilization and building social capital are crucial for long term sustainability of project benefits, hence, the Social Management Unit (SMU) established within ARIAS Society will continue to function under Project Coordination Unit (PCU) to oversee the social aspects of the proposed project. The SMU is headed by a Social Development Specialist and supported by Social Sector Management Specialists to work under the direct supervision of the State Project Director, ARIAS Society. Implementation arrangement of Social Management Unit

Levels	Implementing Units	Manpower for Social/ Agencies
State	PCU	SDS, SSMS, Communication Specialist, MIS Co-ordinator
	O-PIUs	Safeguard Specialist (Social/Environmental)
District	DLCC	Social Experts
Sub district		Support Organizations

326. Role of SMU:

(a) To advise the Project Management on activities/processes to be adopted for achieving the core social development themes i.e. social inclusion (gender, tribal and other vulnerable groups), participation, transparency, accountability, land management, grievance management and citizen feedback envisaged under APART. Implementation measures of social safeguards aspects will be built on Rights based approach.

(b) The SMU inter-alia will be responsible for addressing social safeguard measures.

(c) To ensure that the Social Development Objectives and Social Safeguard Policies of the World Bank is incorporated in the design of the Project & developing strategy/approach to achieve the objectives.

(d) Facilitate preparation of Social Assessment Report and management plans and/or framework for managing Adverse Social impacts, risks and benefits of project interventions.

(e) Facilitate inclusion of vulnerable groups as specified under Sec.5 of the policy – Assam State Roads Resettlement and Rehabilitation Policy (ASRRRP), 2004 in the project interventions.

(f) To develop the capacity of the line department officials in strategic collaborative planning, implementation & monitoring of the activities in compliance with the Social Safeguard Policies of the World Bank.

(g) To build the capacity of all stakeholders in the management of social safeguard issues.

(h) To ensure that social issues have been adequately addressed.

(i) Facilitate integration of social sustainability into policy, institutions, and operations.

(j) Prepare sub-project social assessments, scheme cycle and other analytical tools required for investment design and implementation.

(k) Design operations for strengthening inclusion and participation.

(l) Development of social resilience to climate change and market demand

(m) Guide and Supervise community driven development operations, tailoring them to different settings with a view to enhancing inclusion, community empowerment, community procurement, participation and accountability.

(n) Prepare capacity building plans for stakeholders to ensure social development outcomes.

(o) Orientation of the concerned line department officials on social development principles for improved convergence and linkage, gender issues, transparency and incorporating citizen's feedback into future project interventions

(p) To develop the capacity building manual on social issues, through experienced training agencies (Indicative content of the manual -scheme cycle, outline of Social Assessment, management plans & reporting formats, R&R policy, land acquisition/donation process and other land related matters, identification of project affected people, social entitlement framework, risk assessment & management skills).

(q) Compilation and Analysis of monthly/quarterly reports on social indicators.

(r) Tracking of Grievance Redressal Mechanism and Social Audit.

(s) Hire suitable civil society organization for awareness generation of the project and implementation of land related issues involved in the project, if any during implementation of the project.

(t) Develop decentralized local capacity on managing social issues associated with various sub project cycle.

(u) Co-ordinate review, support and monitor all respective social safeguard aspects of the project.

327. Roles and Responsibilities of Communication Specialist at SMU

(a) Organise workshops among different stakeholders to assess the need and demand of different IEC materials.

(b) To co-ordinate with DLCC, ATMAs and PIUs for the development and implementation of communication strategy for the project at state and district level.

(c) To co-ordinate with Service Providers for preparation of IEC strategy at block and village level to disseminate information of community operation manual, sub project cycle, etc.

(d) To co-ordinate with SMU to identify topics for development of IEC materials on social audit committee, grievance redressal system, citizen's feedback mechanism, gender inclusiveness, etc.

(e) To design and develop IEC material for effective dissemination through multiple channels.

(f) To assess the effectiveness of IEC programmes through periodic reviews, evaluations and impact assessments and to make necessary changes in strategy and materials.

(g) Develop capacity building plans for stakeholders on effective delivery of IEC activities.

(h) To co-ordinate with all PIUs for effective delivery of IEC activities.

(i) To facilitate production of IEC material (print and electronic) for dissemination of information about the Program and to carry out campaigns as and when required.

(j) To document the success/failure stories and lessons learnt.

(k) Support the procurement unit for outsourcing of preparation and transmission of advertisements, jingles and documentary films through various TV and radio channels.

(l) To monitor the progress of IEC activities and project cycles as well as deviations if any.

(m) To co-ordinate with the team of PCU and PIUs at various levels for effective dissemination of IEC strategies across the State.

(n) Prepare monthly progress reports on agreed action plan on IEC

Nutrition Strategy

328. Nutrition is an important contributor to health and to disease. Most countries face nutritional problems from malnutrition and micronutrient deficiencies to obesity and diet related diseases. Agriculture, nutrition, health and gender are interlinked and can be mutually reinforcing.

329. Cereals: Ever since beginning of agriculture, cereals have provided unlimited health benefits to mankind as staple food in our diet. They are rich in carbohydrates that provide energy to the body. Cereals taken up under the project are described below:

(a) **Rice:** Rice is one of the oldest cereal grains. It is a staple food for more than half of the world's population, particularly those living in southern and eastern Asia. White rice is the most commonly consumed type, but brown is increasingly becoming popular in some Western countries due to its health benefits. Various products can be made of rice such as rice flour, rice bran oil, etc. Rice contains maximum amount of carbohydrates in the form of starch, with small amounts of protein and no fat.

(b) **Maize:** With changing lifestyles in developing countries, there is a continuous shift to the consumption of wheat, which influences maize production. A comparison of the available data for wheat, maize and rice put maize as the second most important cereal grain, after wheat and before rice. Maize has three possible uses: as food, as feed for livestock and as raw material for industry. There are marked differences in the chemical composition of main parts of the maize kernel. The seed coat or pericarp has high content of crude fibre. On the other hand, the endosperm contains approximately 88% of starch and 8% of protein. The germ contains approx. 33% of crude fat and relatively high protein and mineral content.

(c) **Pulses:** Pulses are incredibly rich in nutritional value, densely packed with proteins. They are also rich in complex carbohydrates, micronutrients and B-vitamins, which are vital parts of healthy diet. Low in fat and rich in fibre, pulses are excellent for managing cholesterol, digestive health and regulating energy levels. They serve as alternative to meat. Pulses taken up under the project are described below:

(i) **Black gram:** Black gram has been cultivated in India from ancient times. It contains high levels of protein, sodium, potassium, calcium, phosphorous, iron, niacin, thiamine and riboflavin. It complements the essential amino acids provided in most cereals and plays an important

role in Indian diet. It is essentially utilized in Ayurvedic medication. Presence of large amounts of Iron in Black Gram helps to boost the human memory.

(ii) **Lentil:** Lentil is an edible pulse. After meat, poultry, fish and soybeans, it is the next highest source of protein and are very good source of cholesterol lowering fibre. It is a rich source of numerous essential nutrients, including folate, thiamin, pantothenic acid, vitamin-B6, phosphorous, iron, zinc and lysine. It helps in managing blood-sugar disorders. Selenium is a mineral found in lentil that is not present in most other foods that prevents inflammation, decreases tumor growth rates and improves immune response to infection

(d) **Spices & Condiments:** Spices and condiments not only provides taste to the food but also consists of phyto-nutrients, essential oils, antioxidants, minerals and vitamins that are essential for overall wellness. Spices and condiments taken up under the project are described below:

(i) **Ginger:** Ginger composes of unique phyto-chemical compounds and finds a special place in many traditional Indian and Chinese medicines for its disease preventing and health promoting properties. It has been in use since ancient times for its anti-inflammatory, carminative, anti-flatulent, anti-oxidant and anti-microbial properties. It contains health benefiting essential oils such as gingerol. It has been used to help digestion, reduce nausea and help the flu and common cold. It can be used fresh, dried, powdered, or as an oil or juice, and is sometimes added to processed foods and cosmetics. It is very common ingredient in recipes

(ii) **Turmeric:** The roots as well as leaves of turmeric have long been used in traditional Indian and Chinese medicines for their anti-inflammatory, anti-oxidant and anti-cancer properties. It contains health benefitting essential oils. Curcumin, a poly-phenolic compound in the root, is the principal pigment that imparts deep orange colour to the turmeric and have anti-tumor, anti-oxidant, anti-arthritic, anti-amyloid, anti-ischemic and anti-inflammatory properties. It is a very good source of many essential vitamins such as pyridoxine (Vitamin B6), Choline, niacin, riboflavin, etc. Fresh roots contain very good levels of Vitamin-C. It also contains very good amounts of minerals like calcium, iron, potassium, manganese, copper, zinc and magnesium. Potassium is an important component of cell and body fluids that helps in controlling heart rate and blood pressure. Iron is important for red blood cell productions.

(iii) **Mustard:** Mustard seeds are very rich in phyto-nutrients, minerals, vitamins and anti-oxidants. Being one of the chief oil seeds, mustards are indeed very high in calories. The seeds are made of quality proteins, essential oils, vitamins, minerals and dietary fibre. The seeds are excellent source of essential source of essential B-complex vitamins such as folates, niacin, thiamin, riboflavin, pyridoxine (Vitamin B6), pantothenic acid, etc. that helps in enzyme synthesis, nervous system function and regulating body metabolism. Mustards are rich source of health benefitting minerals like Calcium, manganese, copper, iron, selenium and zinc.

(e) Fruits and Vegetables: Fruits and vegetables provide health benefits and are important for the prevention of illnesses. They contain a variety of nutrients including vitamins, minerals and antioxidants. Fruits and vegetables taken up under the project are described below:

(i) **Banana:** Banana fruits are among the most important food crops in the world. They are a healthy source of fiber, potassium, vitamin B6, Vitamin C and various antioxidants and phytonutrients. They are a rich source of carbohydrates, mainly starch in unripe bananas and sugars in ripe bananas. The most common types of sugars found in ripe bananas are sucrose, fructose and glucose. They are beneficial for heart due to their high amount of potassium and antioxidants. Fresh bananas provide adequate levels of minerals like copper, magnesium and manganese

(ii) **Potato:** Potatoes are a very popular food source and widely used vegetable crop in the world. They are one of the sources of starch, vitamins, minerals and dietary fiber. They are very good natural sources of both soluble and insoluble fiber. Its rich fiber content helps in protection from colon polyps and cancer. They are one of the richest sources of vitamin B-complex such as pyridoxine (Vitamin B6), thiamin, niacin, pantothenic acid and folates. Fresh potato along with its skin is one of a good source of Vitamin –C. They also contain adequate amounts of many essential minerals like iron, manganese, magnesium, phosphorous, copper and potassium

(iii) **Tomato:** Tomatoes are one of the low-calorie vegetables, very low in fat contents and have zero cholesterol levels. They are excellent source of antioxidants, dietary fiber, minerals and vitamins. On account of their qualities, they are good in cholesterol controlling and weight reduction. They anti-oxidants present in tomatoes are scientifically found to be protective against cancers. Lycopene, a flavonoid antioxidant, is unique phytochemical compound found in the tomatoes protects the skin from harmful UV rays. Zea-xanthin is another flavonoid compound present abundantly in this vegetable helps protecting eyes in elderly persons. It contains good levels of vitamin A and flavonoid anti-oxidants such as α and β-carotenes, xanthins and lutein helps in night vision, maintenance of mucusa and skin and bones. They are also good source of antioxidant Vitamin-C. Fresh tomato is very rich in potassium

(iv) **Cabbage:** Cabbage is relatively low in fat, proteins and calories. They are store house of many powerful antioxidants such as lutein, zea-xanthin, etc. that provides protection against cancer and reduce LDL or bad cholesterol levels in the blood. Fresh cabbage is an excellent source of Vitamin C. It is also rich in essential vitamins such as pantothenic acid (Vitamin B5), pyridoxine (Vitamin B6) and thiamin (Vitamin B1). It also contains adequate amount of minerals like potassium, manganese, iron and magnesium and is low in sodium. Cabbage is a very good source of Vitamin K which plays a potential role in developing healthy bones

(v) **Cauliflower:** Packed with essential nutrients, cauliflower is one of familiar vegetables. Its compact flower heads hold numerous health benefiting phyto-nutrients such as vitamins, indole-3-carbinol, sulforaphane, etc. that help prevent overweight, diabetes and offer protection from prostrate, ovarian and cervical cancers. Cauliflower is low in calories, fat and sodium but rich in fiber, vitamin C and potassium. It is remarkably low in calories, fat and cholesterol. It contains good amounts of many vital vitamin B-complex such as folates, pantothenic acid, pyridoxine, thiamin, niacin as well as Vitamin K. These vitamins are essential to the body for fat, protein and carbohydrate metabolism. It is also good source of minerals such as manganese, copper, iron, calcium and potassium.

(vi) Pumpkin is one of the widely grown vegetables incredibly rich in vital antioxidants and vitamins. It is low in calories and carries vitamin A and flavonoid poly-phenolic antioxidants such as lutein, xanthin and carotenes in abundance. It has highest levels of Vitamin A which is essential for good visual sight. It contains anti-oxidant Zea-xanthin that protects the retina of the eyes from UV rays. It is good source of Vitamin B-complex like folates, niacin, pyridoxine, thiamin and pantothenic acid. It is also rich source of minerals like copper, calcium, potassium and phosphorus. Pumpkin seeds are excellent source of dietary fibre and mono-unsaturated fatty acids, which are good for heart health. In addition, the seeds are concentrated sources of protein, minerals and health benefitting vitamins.

(vii) Brinjal is very low in calories and fats but rich in soluble fiber content. The skin has significant amount of anti-oxidants called anthocyanins which have potential health effects against cancer, aging, inflammation and neurological diseases. It contains good amounts of important Vitamin B-complex such as pantothenic acid, pyridoxine, thiamine and niacin. These vitamins are required by the body for fat, protein and carbohydrate metabolism. This vegetable is an also good source of minerals like manganese, copper, iron and potassium.

(f) **Livestock and Fisheries:** Livestock is a rich source of high quality foods such as milk, meat and eggs and a source of income and employment to rural farmers, particularly women. Fish provides essential nourishment especially quality proteins, fats, vitamins and minerals. Livestock commodities taken up under the project are described below:

(i) **Pork:** Pork is the meat of the domestic pig. It is most commonly consumed red meat worldwide. It is often eaten unprocessed, but cured (preserved) pork products are also very common. These include smoked pork, ham, bacon and sausages. It is a high-protein food and contains varying amounts of fat. It contains all the essential amino acids necessary for growth and maintenance of our bodies. The fat content of pork is mainly made up of saturated and monounsaturated fats. It is a rich source of vitamins and minerals like Thiamin, Selenium, Zinc, Vitamin B 12, Vitamin B 6, Niacin, Phosphorous, Iron, etc. It is effective for growth and muscle function

(ii) **Milk:** Milk provides many of the nutritional elements necessary for the growth and maintenance of the human body. It can be taken in form of fresh milk, dried milk powder, pasteurized milk and condensed milk. It is also used to prepare milk products like – yoghurt, cheese, ice cream, etc. Milk contains several vitamins and minerals that are essential to health. Along with calcium, which is responsible for the bone mass benefits, there are other vitamins and minerals that benefit the body. Some of the benefits of taking milk are - it helps in building and maintaining bone and teeth, preventing cardiac diseases, improving immunity, protecting eyesight, helping in growth, etc

(iii) **Fish:** Fish is a food of excellent nutritional value, providing high quality protein and a wide variety of vitamins and minerals, including vitamins A and D, phosphorous, magnesium and selenium. Its protein like that of meat is easily digestible and is an alternative source of animal protein. It improves the quality of dietary protein by complementing the essential amino acids that are often present in low quantities in vegetable based diets. Fish oil is the best source of omega-3 fatty acids which helps in brain development

Gender Strategy

330. The Social Assessment has highlighted the following issues related to Women:

- Role of women in decision making process on household level or community level activities/programs is not explicit. Domination of the decision making bodies of the markets by male members.
- Women contribute significantly to agriculture and other economic activities besides performing their household duties but their contributions are not duly credited.
- Women are not economically independent. The loan availed by women from SHG or MFI is utilized by their husbands for income generating activities as well as domestic consumption.
- Male labourers get higher wages than that of the female.
- Average landholding size among women is very less. In majority of cases the ownership of land lies with men, only in some exceptional cases women owners are there.
- Except in Sericulture, Handloom and Textile sector, market is mainly taken care of by men. Women face lots of constraints to transport their products to the markets. All the wholesalers, big retailers and aggregators are men, only very few small vendors are women.
- Accessibility to banking services among women is less than that of men.
- Women have limited access and lack of exposure to upgradation of technical skills so more dependent on traditional skills due to this less contribution to commercial demand.

331. Substantial engagement of women has been observed in agriculture, sericulture, handloom and textile, piggery, beel fisheries and food processing sector. Thus, engagement of women in the project activities is crucial. The project shall have potentially significant impact on promoting gender inclusiveness through engagement of women in post harvest management and processing which traditionally employ a higher proportion of female labour. Gender strategy has been detailed out in the Social Management Framework for mainstreaming the gender issues and concerns in all interventions at every stage, across all institutions and processes for facilitating inclusion and participation of women farmers and entrepreneurs.

332. Under the gender strategy, the project shall undertake the following:

(a) **Gender disaggregated socioeconomic baseline:** Disaggregated data shall be collected during baseline data collection by the M&E agency for subsequent usage in mid-term and end-term evaluation and achievement of KPI.

(b) **FGDs and Social Mobilization:** In order to ensure that the needs and issues of women are well articulated, expressed and recorded, FGDs shall be conducted by the service providers using experienced community mobilizers/facilitators. NGOs having prior experience of working with women farmers and entrepreneurs shall be engaged. Social experts of the DLCC shall be responsible for liaising with social welfare departments of the districts for ensuring effective co-ordination and support. FGDs and meetings shall be scheduled as per the timings and locations feasible for increased participation of women. Such meetings shall be conducted at every stages of project intervention to identify the gender issues.

(c) **Inclusion of women in associations, organizations, committees, etc.:** Even though women contributes significantly to the agriculture as well as in other sectors but due to lack of ownership on the resources women are not able to access the project interventions. Hence, inclusion of women in Farmer Interest Groups, Farmer Producer Organizations, Industrial Associations, Beel Development Committees, etc. shall be ensured by defining the selection criteria for women in sub project activities and through strategic social mobilization.

(d) **Training and Capacity Building:** Women farmers/entrepreneurs shall be given adequate technical training on every sector, entrepreneurial support, participation in post harvest management, etc. The training programmes shall be customized to fit into the requirements and expectations of women beneficiaries. To overcome the constraints of staying out of the households for long duration, field level demonstrations, trainings, workshops, etc. shall be planned in close proximity of habitation. For encouraging access to financial services, inclusion and participation shall be ensured in financial literacy programmes and access to market services. In case of women in tribal areas, such trainings shall be conducted using culturally appropriate IEC materials and in culturally appropriate manner through the involvement of experienced trainers from the community.

(e) **Benefit sharing:** Suitable selection criteria shall be designed for ensuring benefit sharing by women in all sub project interventions.

(f) **Gender dis-aggregated monitoring indicators:** Monitoring indicators shall be designed for dis-aggregating data on gender for evaluating the project during mid-term and end term. User Satisfaction surveys shall lay emphasis on satisfaction of women farmers/entrepreneurs with project interventions, activities and processes. Monitoring shall be done on involvement of women in Grievance Redressal Mechanism.

(g) **Involvement of women for social mobilization activities:** Provisions shall be laid down for inclusion of women in social mobilization activities along with men for facilitating faster outreach to targeted women beneficiaries, ensure adherence to selection criteria and facilitate involvement of eligible women beneficiaries in sub project interventions.

Grievance Redressal Mechanism (GRM) & Citizen Feedback System

(A) Grievance Redressal Mechanism (GRM)

333. In APART the Grievance Redress Mechanism (hereafter referenced as GRM) is a critical tool for promoting both transparency and accountability in project operations. The GRM is embedded into the various facets and dimensions of the project through a well-designed and operational efficient mechanism drawing on international best practices (see World Bank, Governance and Anti-Corruption Policy Note, 2010). From an operational perspective, APART PIUs and PCU recognize the role of the GRM as critical towards enhancing operational efficiency towards ensuring beneficiary and citizen awareness/engagement in the project. This is alongside providing multiple channels (offline and on-line) by which citizens including women, ethnic minorities and the youth can provide feedback to strengthen the operational objectives and deter miscellaneous practices while underscoring the project foundation as one that is accountable, transparent and responsive to beneficiaries.

334. APART acknowledges that an effective GRM is built on organizational commitment both in terms of recognizing the role of the GRM as well as supporting its operationalization. It also embodies fairness in handling grievances confidentially, impartially and transparently. The project recognizes that procedures to file grievances and seeking action need to be easily understandable and accessible for the project beneficiaries to make the GRM effective. Quick response and adequate training increases the efficiency of GRM. An effective GRM also considers the principles of participation and social inclusion.

335. The **GRM Value Chain of APART:** APART will establish multiple channels by which grievances can be received by the project. These can be broadly classified as – Online -Services (e.g., Toll Free Helpline and via the Project web-platform) and Offline/Manual (e.g., Snail Mail, In Person and at Compliant Centers/Drop-Boxes). For all grievances submitted through online mode, PCU will be reviewing for sensitivity/confidentiality, assessment of any issues pertaining to COI for the office/personal prior to such grievances being channeled to the GRO at the district level.

336. In the processing of all grievances, APART will follow international best practices including adoption of basic procedures including acknowledging all grievances, assigning a central tracking number/ID for all grievances alongside basic service standards for response. APART has also established an operating procedure for the handling of unresolved grievances through a process of escalation – where unresolved grievances will be transmitted to the next higher level –to OPIUs and then PCU. The PCU will also aggregate all grievances to a consolidated single database to monitor performance of PIUs with service standards as assigned in Section 1.3.5and generate aggregated statistics on performance to be publically disclosed on the projects web-platform.

337. APART will assign Grievance Redressal Officer (GRO) and Appellate Authority (AA) in all the implementing units both for State and District as shown in Table 1.3.Furthermore, at DLCC levela designated focal person will be assigned responsibility to monitor the GRM and co-ordinate with all the implementing units as shown below-

Implementing units	Grievance Redressal Officers (GROs)		Appellate Authority (AA)	
	State level	**District level**	**State Level**	**District Level**
Agriculture	Additional Director Extension	Assistant Director of Agriculture	Director of Agriculture	District Agriculture Officer
Fishery	Nodal Officer	District Fisheries Development Officers	Director of Fisheries	Nodal Officer
PWD	Executive Engineer	Executive Engineers of divisions	Chief Engineer	Superintending Engineer of the concerned circle
Assam Agriculture University	Director of Research, Agriculture		Registrar of AAU	
Dairy Development	Joint Director	District Dairy Officer	Director	Zonal Deputy Director
A.H. & Veterinary	Additional Director	District Veterinary Officers	Director of Animal Husbandry & Veterinary Department	Joint Director
Department of Sericulture	Nodal Officer	All Assistant Directors	Director of Sericulture	Nodal Officer
Department of Handloom & Textiles	Nodal Officer	All Assistant Directors	Director of Handloom & Textiles	Nodal Officer
Department of Industries & Commerce	Deputy Secretary	All General Managers, District Industries & Commerce Centres	Commissioner, Industries & Commerce, Govt. of Assam	Deputy Secretary
WAMUL	Managers		Managing Director	
Assam State Warehousing Corporation (ASWC)	Divisional Manager, Lower Assam Division	All Warehouse Managers	Registrar of Co-operative Societies.	Divisional Manager, Lower Assam Division
Assam State Agricultural Marketing Board (ASAMB)	Public Information Officer		Chief Executive Officer	
ALPCO	General Manager		Managing Director	

338. Roles and Responsibilities of GRO and Appellate Authority

(a) **GRO:**

(i) Responsible for monitoring of all the grievances submitted manually through drop box and entering it in the GRM register with a reference number in the format Department(Name of implementing agencies/ATMA/DLCC)/District/Year/Serial number).

(ii) Addressing the grievances following the detailed procedures within the stipulated service delivery time as outlined in a later section.

(iii) Ensure the completion of monthly reporting on grievances in the PMIS based on the assigned results indicators.

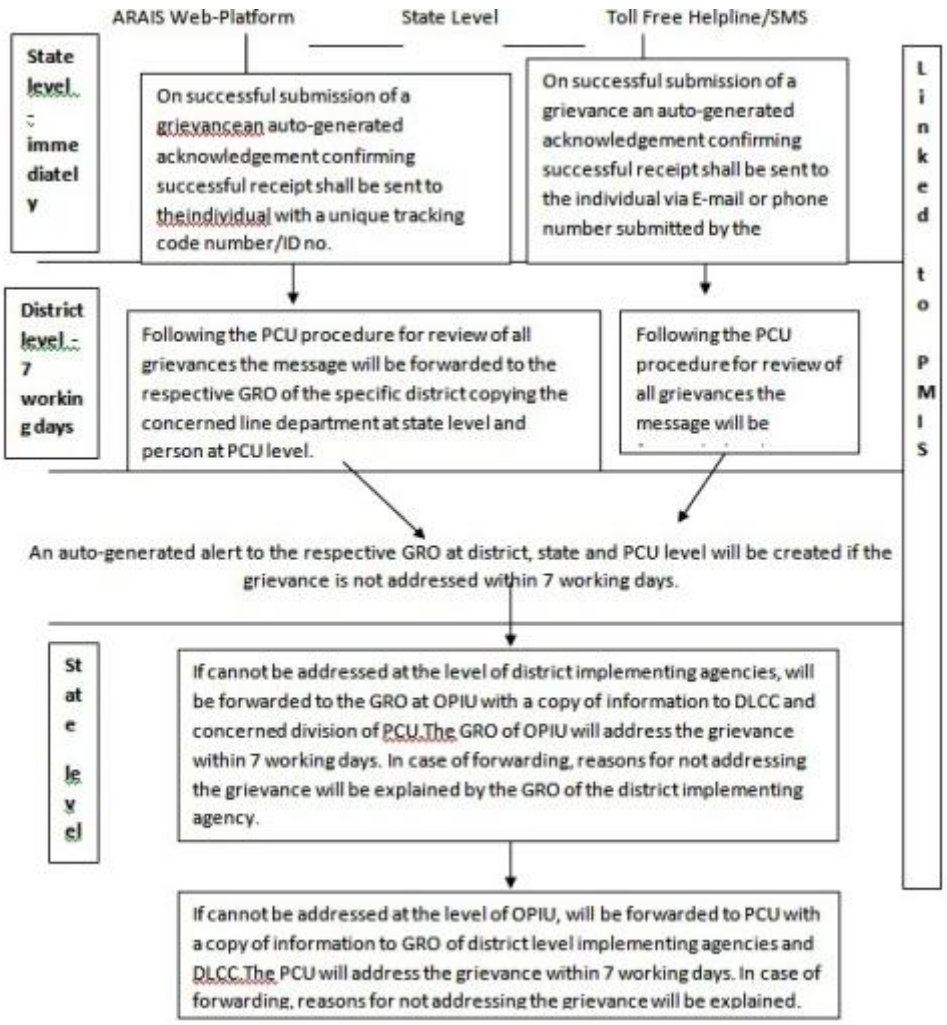
(b) **Appellate Authority:**

(i) Monitor the timely redressal of all grievances by the GRO.

(ii) Monitor grievances related to conflict of interest and arbitration submitted through manual mode and forward to PCU.

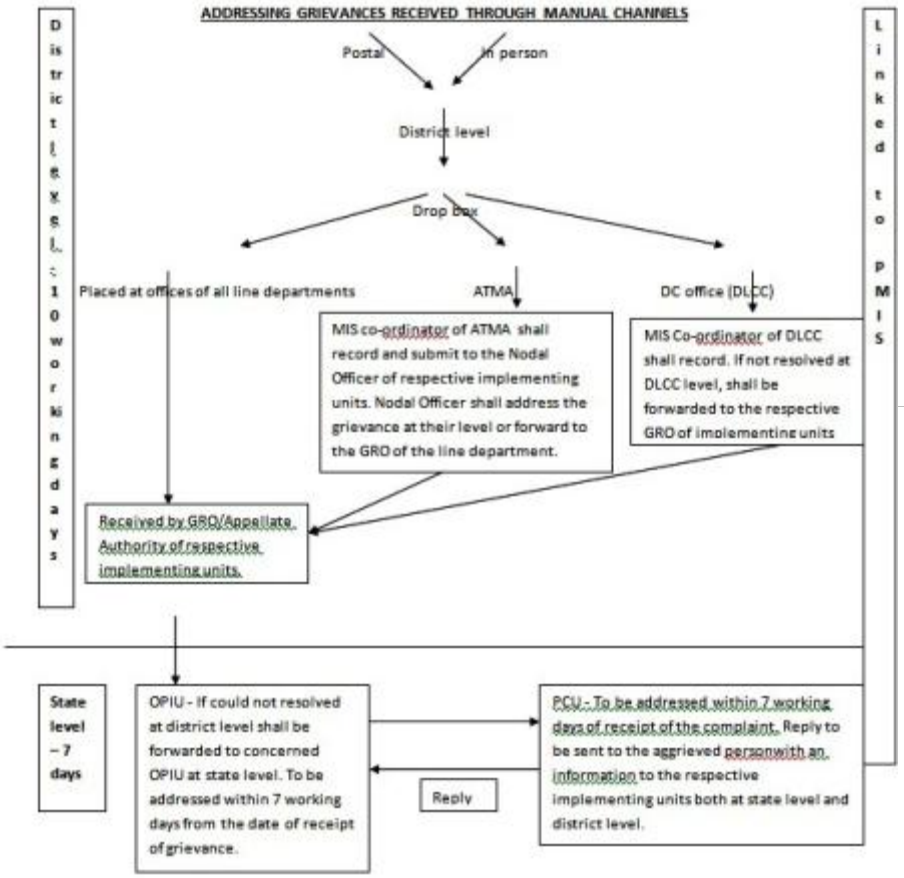
(iii) Review and report on the performance of grievances through PMIS

339. Flow of Grievances received through Online/ e-Services: APART has adopted a multi-mode mechanism by which beneficiaries and other stakeholders can provide grievances on the project. The Online e-Services (e.g., Toll Free Helpline, and via the Project web-platform) will provide an innovative platform to several GRM thereby extending the reach, accessibility and efficiency (e.g. transaction cost) of such modalities. A flow-chart for this process is highlighted in Figure 1.3.The ARAIS Society has already established a web-platform that will be extended under APART to incorporate the online GRM web-form that will permit citizens to submit their grievances online



340. Flow of Grievances received through Manual Channels: APART acknowledges the digital challenges in accessing Online e-Services particularly in reaching the target beneficiaries of the program. To this end –the offline/manual mode of GRM will be retained with a focus on improving the manual

process to allow for efficiency in transactions related to a reduction in response times for each grievance. The process flow for grievances submitted offline/manual modes is depicted below.



341. Service Standards for online channel:

Level of addressing grievance	Action to be taken	Responsibility	Timeline
First level – State level	1. Grievance will be received and automatically registered on the web portal of APART at PCU and a unique code will be sent to the aggrieved person as an acknowledgment.	Webportal of ARIAS Society will be managed by MIS Section.	Immediately
	2. Will be automatically forwarded to the respective GRO of concerned implementing agency at the district level with a copy of information to the concerned division at the PCU, GRO at OPIU and DLCC.		
Second level – District level implementing agencies	3.Addressing the grievance.	GRO of the district level implementing agencies	Within 7 working days from the receipt of grievances.
	4. Sending reply of the grievance to the aggrieved person with a copy of information to GRO of district implementing agencies, GRO of OPIU, DLCC and concerned division of PCU.		
	5.If cannot be addressed at the level of		

Level of addressing grievance	Action to be taken	Responsibility	Timeline
	district implementing agencies, will be forwarded to the GRO at OPIU with a copy of information to DLCC and concerned division of PCU.		
	6.In case of forwarding as mentioned above in sl. No. 5, reasons for not addressing the grievance at the second level will be explained by the GRO of the district implementing agency.		
Third level – OPIUs	7.Addressing the grievance.	GRO of the OPIU	Within 7 working days of receipt of grievances.
	8.Sending reply of the grievance to the aggrieved person with a copy of information to GRO of district implementing agencies, DLCC and concerned division of PCU.		
	9.If cannot be addressed at the level of OPIU, will be forwarded to concerned division of PCU with a copy of information to GRO of district level implementing agencies and DLCC.		
	10.In case of forwarding as mentioned above in Sl. No. 9, reasons for not addressing the grievance at third level will be explained.		
Fourth level - PCU	11.Addressing the grievance.	Concerned division of the PCU.	Within 5 working days of receipt of grievances.
	12.Sending reply of the grievance to the aggrieved person with a copy of information to GRO of district implementing agencies, DLCC and GRO of OPIU.		

342. Service Standards for manual Channel

Level of addressing grievance	Action to be taken	Responsibility	Timeline
First level – District level	1. Grievance will be received and registered manually on the grievance redressal register with a Sl. No.	MIS focal person of district implementing agencies/ ATMA/ DLCC.	Within 2 working days of receipt of grievances.
	2. Will be forwarded to the respective GRO of concerned implementing agency.	MIS focal person.	
	3.Grievances registered at ATMA will be forwarded to concerned GRO of the district implementing agencies.	PD ATMA	Within 5 working days of receipt of grievances.
	4. Grievances registered at DLCC will be forwarded to concerned GRO of the district implementing agencies.	Chairman of DLCC	
	5.Addressing the grievance.	GRO of the district level implementing	Within 10 working days from the
	6. Sending reply of the grievance to the		

Level of addressing grievance	Action to be taken	Responsibility	Timeline
	aggrieved person with a copy of information to DLCC, ATMA, GRO of OPIU and concerned division of PCU.	agencies	receipt of grievances.
	5.If cannot be addressed at the level of district implementing agencies, will be forwarded to the GRO at OPIU based with a copy of information to DLCC, ATMA and concerned division of PCU.		
	6.In case of forwarding as mentioned above in Sl. No. 5, reasons for not addressing the grievance at the second level will be explained.		
Second level – OPIUs at state level	7.Addressing the grievance.	GRO of the OPIU	Within 7 working days of receipt of grievances.
	8.Sending reply of the grievance to the aggrieved person with a copy of information to GRO of district implementing agencies, DLCC, ATMA and concerned division of PCU.		
	9.If cannot be addressed at the level of OPIU, will be forwarded to PCU with a copy of information to GRO of district level implementing agencies, DLCC, ATMA and concerned division of PCU.		
	10.In case of forwarding as mentioned above in Sl. No. 9, reasons for not addressing the grievance at second level will be explained.		
Third level - PCU	11.Addressing the grievance.	Concerned division of the PCU.	Within 7 working days of receipt of grievances.
	12.Sending reply of the grievance to the aggrieved person with a copy of information to GRO of district implementing agencies, DLCC, ATMA and GRO of OPIU.		

343. Nature of Grievances: Given the diverse typologies of grievances/beneficiary feedback, APART will use the initial classification to reflect the components of the project including Procurement, Quality of Services, Construction, Entitlements, Financial, Social, Environmental, issues related to Addressing of Grievances. This will then be sub-classified according to the type of grievance: Comments/Suggestions, Queries, Non-performance of Project Obligations, Violations of Laws/Corruption and Complaints of Project Staff/Service Providers involved in project management

344. Accessibility of the aggrieved person: Any beneficiary or citizen who has successfully submitted a grievance can verify the status of their grievance(s) at any time by referencing the acknowledgement number/unique tracking ID code provided to them at time of submission. All grievances submitted shall be handled in the utmost confidence and the PCU/PIUs will ensure non-disclosure of all personal information. This will extend to additional arrangements for maintaining confidentiality at the request of the individual or where matters are considered sensitive. The project will publically report aggregated statistics on performance of PIUs via the ARIAS Society website.

345. Training on GRM: A comprehensive set of trainings on the GRM will be conducted covering the PCU and PIUs at the State and District. The training will be cascaded from the PCU that will train State

Level PIUs Officials as part of the Social Safeguards Training. The PCU and State Officials will join the training sessions for the District Level PIUs to be conducted by DLCC. Service providers and ATMAs will also receive training on the GRM. Table below depicts the training schedule/requirement on the GRM:

Type of training	Level of training	Participants	Timeline
2-day Orientation on Social Management Framework (SMF) including Grievance Redressal Mechanism (GRM) & Citizen Feedback System (CFS)	State level	Key officials of OPIUs	Y1, Y3
	District level	Key officials from district level line departments.	
1-day sensitization workshop on GRM and awareness generation	State level	Service Providers (SPs) and Communication agency.	
1-day sensitization workshop for FPOs and IAs on GRM and CFS.	District level	SPs, FPOs, IAs.	Y3, Y4, Y5
1 day orientation of Social Audit Committee (SAC) members on Social Audit Manual including GRM and CFS.	District level	SPs and SAC members	

346. Information dissemination on GRM: Raising awareness through a communication strategy will be critical to the adoption and usage of the GRM. The following outlines this initial strategy including the rollout plan under APART:

(a) Preparation of display materials including the following – communication on the multi-mode channels by which citizens can submit a grievance including the process and procedure; information on accessing the online GRM(e.g., URL of the web-platform for ARIAS Society/APART project; Toll Free Helpline); providing information on the designation and contact details of GRO and Appellate Authority for all implementing units both for state and district level and publishing the service standards including timelines for addressing grievances at a local level. Materials will also be developed in local language

(b) Display communication materials at the project districts at prominent locations such as public places, community institutions, markets, construction sites, consultation sites, training sites, block offices under each cluster. This will also include District Administrative offices (DLCC), ATMA offices of the project districts, DICC offices of the project districts, concerned offices of the line departments at district level

(c) At the State Level, all the OPIUs to display the designation and contact details of their concerned GRO and Appellate Authority both for the state level and for the district level in visible locations preferably in the entrances, notice boards, etc

(d) Awareness generation on GRM by the Service Providers in co-ordination with the Communication Agency.

(e) Developing IEC materials on GRM and display and distribution in project areas during consultations, demonstrations, at construction sites & markets, etc.

(f) IEC materials developed by the concerned implementing units to include the details of their respective GRO and Appellate Authority, website of ARIAS Society for APART and the toll free number.

347. GRM M&E: Monitoring and evaluation are critical to the success of any GRM. Project Management and Information System (PMIS)shall be the tool for the monitoring and management of the GRM. All the grievances received, to be entered into the PMIS by the respective implementing units. The status of the grievances to be updated as and when addressed or forwarded by the respective implementing units. Based on the requirements, provisions to be created in the PMIS for generating periodical reports on GRM. Regular analysis of the data on grievances is required to identify problem areas and enhance service delivery. Indicators on grievances have been included in the project results framework both in the PAD and PIP. Moreover, PMIS shall be having following indicators for grievance monitoring:

(a) Number of grievances submitted (disaggregated by time (monthly, quarterly, yearly); PIU; and Grievance Type);

(b) Number of grievances addressed and unresolved(disaggregated by time (monthly, quarterly, yearly); PIU; and Grievance Type);

(c) Percentage of grievances redressed within stipulated time period (disaggregated by time (monthly, quarterly, yearly); PIU; and Grievance Type);

(d) Average time required to resolve a grievance (disaggregated by time (monthly, quarterly, yearly); PIU; and Grievance Type);

(e) Number of grievances escalated to a higher authority (disaggregated by time (monthly, quarterly, yearly); PIU; and Grievance Type);

348. Conflict of Interest: Grievances against district level implementing agencies, ATMA, DLCC and OPIUs will be forwarded to PCU to handle conflict of interest within 3 working days of receipt of grievances. If the grievances require further investigation at district level, PCU will forward the grievance to the DLCC for impartial investigation within 3 working days from the receipt of grievances. DLCC should send the report of the investigation to the concerned division of PCU with 10 working days. Based on the investigation report, PCU will prepare a reply and send to the aggrieved person within 7 working days from the date of receipt of investigation report from DLCC with copy of information to concerned DLCC. Grievances addressed by PCU will also be entered into the PMIS.

349. Arbitration: If any beneficiary/citizen is not satisfied with the response of the grievance can register the grievance for further clarification either through online or offline. All the grievances requiring further clarification will be forwarded to PCU within 10 working days from the receipt of grievance. PCU will undertake necessary investigation and will send a reply to the aggrieved person within 10 working days from the receipt of grievances.

350. Confidentiality: In case of online mode, if any beneficiary or citizen seeks confidentiality, name and address of the person will not be accessible to anyone. There will be an option for maintaining confidentiality in the design of the electronic GRM. Only E-mail ID and contact number of the person can be viewed.

(B) Citizen Feedback System (CFS)

351. Citizen engagement is essential for better service delivery with improved social accountability. It helps in overcoming mistrust between the implementing agencies and the civil society. Citizen engagement in APART shall be ensured by establishing a Citizen Feedback System (hereafter referred to as CFS). The term citizen is not used in a legal sense but is understood in the broad sense of referring to all people in a society or country in an inclusive and non-discriminatory manner. There is a growing

demand from civil society and citizens for participation in decision making process as well as implementation of developmental programs. In such a scenario, APART needs to have a mechanism for citizen feedback inbuilt to the project design. Outcome of the feedback analysis shall be utilized to improve service delivery, provide corrective measures, for project performance assessment and finally for better project implementation.

352. Purpose of CFS: The feedback of the citizens may be received in the form of suggestions, comments, or remarks. During the project implementation stage, people may suggest for corrective measures and give new ideas to improve service delivery. Monitoring of project activities by the stakeholders can also be undertaken to assess project performance during implementation as well as completion stages. The citizens may express satisfaction over the performance of the project with their active participation in the decision making process during operation and closure stage

353. Objectives of CFS: Beneficiary feedback is a subset of the citizen engagement wherein all relevant people will be engaged, particularly vulnerable citizens. Gender and indigenous peoples' related aspects should be considered in citizens' feedback. Interests of poor and marginalized women should receive particular attention, and efforts should be undertaken to increase their participation.

The broad objective of CFS is to collect feedback from the all citizen especially marginalized sections, farmers, entrepreneurs, producer groups, sector management companies and other value chain participants and undertake evidence based corrective measures during project mid -term for course correction. The specific objectives of CFS are:

a) To provide a forum for citizen's engagement in project implementation and design;

b) To enhance opportunity to share their opinions/views/ suggestions with the project management;

c) To encourage better monitoring of the service delivery and constant improvement; and

d) To enhance citizen engagement in local governance

354. Potential CFS Users:

(a) **Beneficiaries**: Members of FPOs, Common Interest Group (CIGs), Farmers' Interest Group (FIGs), SHGs and Industrial Associations to be promoted under APART.

(b) **Opinion Builders**: Members of Civil Society, Academicians, Researchers, Community Leaders, Women Associations, Labour Unions, students, etc;

355. CFS Framework: The proposed framework shall allow citizens to identify their roles and responsibilities and to access the project benefits, and also provide an opportunity to participate in the decision making process. The CFS shall facilitate APART to be more inclusive and responsive to citizen's needs. However, it is important to decide how much feedback shall be sought from the citizens considering the capacity of the project to handle the feedbacks. This is important because inefficient handling and no/delayed response to the feedback shall have negative impact on participation of the citizen in the process.

356. The project communication and disclosure strategy shall strengthen the functioning of the CFS. Intensive information dissemination on various sectors and disclosure of the documents and all relevant information of the project shall be carried out. Information dissemination and disclosure shall be through – (i) websites of PCU, line department/agency, (ii) display in local languages at district, Sub Division (Civil), Block Panchayat and village level (iii) street plays and other medium (iv) awareness programmes and IEC campaigns and (iv) community as well as stakeholder's consultations. The users, officials of participating departments/agencies shall be educated about type of feedback expected/useful through proper

information dissemination during various stages of Project Cycle namely planning, implementation and completion.

357. Intensive communication and mobilization campaign shall be undertaken before and during the project implementation for encouraging citizens to meaningfully participate in the CFS. The framework shall provide for capacity building of the project staff at various levels to enable them to respond to the feedback in a timely manner and take corrective measures. It is to be ensured that the project has changed for better service delivery as a result of feedback provided through the CFS built into the project design

358. Tools for Citizen Feedback: CFS tools shall basically be IT based and supported by other community sensitive tools like social audit and satisfaction survey to enable larger number of citizen, especially the marginalized groups, to participate in the system

(a) **ARIAS Society Web Portal:** The project shall have one exclusive online portal for information dissemination about details of APART namely implementation arrangements, sectors and areas covered under the project, sanctioned sub-projects, services available, physical and financial progress, quality assurance, safeguard issues, reports/documents, grievances and feedback. The web portal shall have user friendly provisions for sharing feedback online, by the citizens.

(b) **Through Feedback Box:** Installation of "Feedback boxes" in the district level implementing units, ATMA, CSCs and DLCC office for providing opportunity to people who does not have excess to ICT (Information and Communications Technology) to provide their suggestions or feedback to the concerned department and it is optional for them to either disclose their identity or not. Installation of Feedback box in investment outreach programs and community based programs will enable to get the feedback from the citizens present in the programs. Effective positioning of feedback box in a visible position with a sense on anonymous environment can facilitate its increased utilization.

(c) **Social Audit:** Social Audit shall be used as a tool for CFS. Social audit is required to improve an organization's social performance and helps to narrow gaps between objectives of an organization and actual functioning. It gives opportunity to civil society to share their opinion/views on functioning of an organization in terms of social performance.

(i) **Objectives of Social Audit:** The broad objective of social audit is to achieve social development principles of social inclusion, participation, transparency and accountability. The specific objectives of social audit are to:

- Monitor performance of SPs;
- Enhance communication and create awareness among beneficiaries and providers of local social and productive services;
- Ensure transparency in procurement procedures under the project;
- Ensure inclusion of FPOs in the project implementation;
- Social Mobilization and conflict management/crisis management;
- Increase efficacy and effectiveness of local institutions;
- Ensure timely access to the services by stakeholders;
- Assess the physical and financial gaps between needs and resources available;
- Ensure people's participation in planning and decision making; and
- Ensure compliance of the process related to involvement of land in the project activities for protecting rights of the indigenous peoples.

(ii) **Outcome of Social Audit:** Social audit shall help to-

- Build the capacity of the community on participatory local planning;
- Ensure local democracy;
- Ensure participation and involvement of eligible beneficiaries from various sections of society;
- Ensure project benefits to disadvantaged groups;
- Promote collective decision making and sharing responsibilities and
- Develop social capital
- Ensure transparency, accountability

(iii) **Formation of Social Audit Committees in Institutions to be promoted under APART:** There shall be one Social Audit Committee (SAC) in each of the FPOs promoted under APART. The composition and functions of SAC are described below-

- There will be a 3 to 7 member (depending upon the size of the institution) democratically elected SAC within each of the FPOs. The members of the SAC shall be elected by the Board of Directors of the FPO. The SAC should have minimum one third women representation and under no circumstances members of the Executive Committee (EC)/Board shall become eligible for membership of the SAC.
- The main function of the SAC is to monitor the functioning of Executive Committee/Board and ensure that the principles of: efficiency, equal opportunity and transparency are followed by the Executive Committee/Board for running the institutions and implementing the activities being taken up by them. Further, SAC should monitor that disclosure of all documents, income, expenditure and accounts etc. are being made by EC. The SAC shall carry out social audit on bi-annual basis

(iv) **Activities of Social Audit Committee:** The SAC shall take up the following activities for half-yearly social audit

- Review and scrutiny of the books of accounts;
- Review and scrutiny of applications/requests received from the members for a particular service, benefit being offered by the institution;
- Conduct FGDs with the Board of Directors and EC members to see that the institution is functioning in compliance of the principles of social inclusiveness, participation, transparency and accountability; and
- Carry out social audit consultations with the members, other stakeholders and service providers.

SAC shall complete the audit process within 30days from the completion of 6 months of the project's annual cycle and prepare a brief social audit report, duly facilitated by the SPs. The report shall include suggestive measures for– (i) promoting inclusiveness, participation, transparency and accountability; (ii) improving record and accounts keeping; (iii) public disclosure of decisions/documents/accounts; and (v) list out functionaries found guilty of violating the established norms/procedures and punishment thereof. The report shall be placed before the Board of Directors for detailed deliberations and approval. The approved report shall be shared with the DLCC, PIUs and PCU. DLCC, PIUs and PCU shall review the social audit reports and take necessary corrective steps. The social audit report shall be displayed in their office notice board for one month from the date of approval.

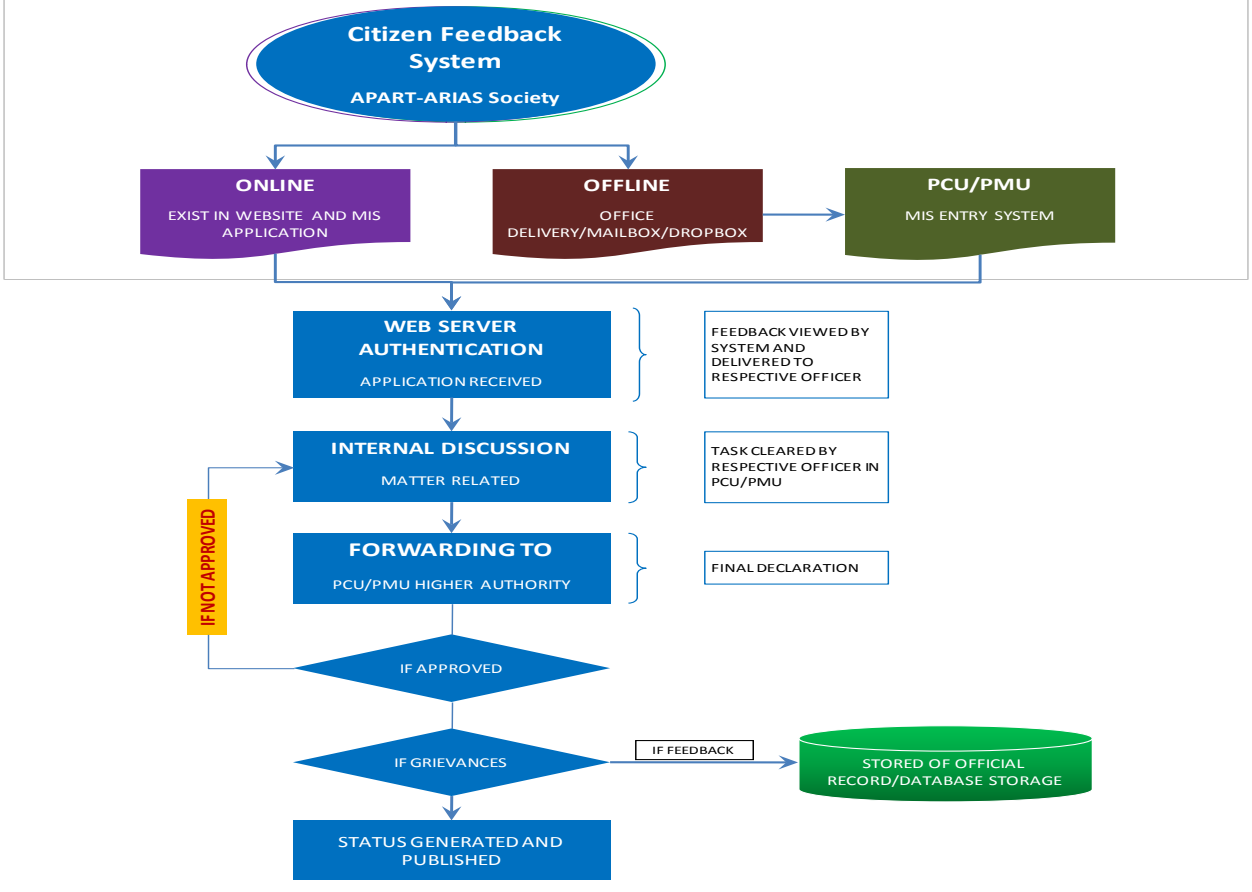
(v) **Social Audit Manual:** The social audit manual will be prepared for the use of agencies established in the project in consultation with the respective line departments.

(vi) **Satisfaction Survey:** A satisfaction survey shall be carried out to assess the feedback of beneficiaries and other citizens on the implementation of the project activities. The survey questions shall touch upon issues of relevance/appropriateness of services, timeliness, information dissemination and access to services. The purpose of the survey shall be the following:

- To find out whether citizens were satisfied with the services received under the project
- To expand the knowledge base, identify best practices and provide concrete recommendations for the improvement of project performance in future
- To enhance the visibility of the institutions involved in the implementation of the project
- To provide feedback on further improvement possibilities of the satisfaction survey and its usage

The satisfaction survey shall be carried out offline as well as online. Provisions shall be created in the web portal to facilitate capturing of responses from the users on the satisfaction survey questions. Mobile survey designs shall also be developed to run on smart phones

359. Functioning of CFS: The proposed mechanism for receiving and reporting of citizen's feedback in the PMIS is depicted below. The procedure for receiving offline and online feedback shall be different as a feedback submitted online would be received directly at the Project MIS. However, in case of an offline submission of a feedback, the DLCC should report the same to the PCU on monthly basis for information and record. If the Feedback is received in the form of grievances it will be forwarded to the concerned Grievance Redressal Officers (GROs) for action.



360. M&E for CFS: The CFS under APART shall be monitored against a set of indicators described in **Table below**. Evaluation of the CFS shall be carried out as part of the overall project Monitoring & Evaluation (M&E) of APART.

Principles	Information Areas	Indicators
Social Inclusion: Both an outcome and a process of improving the terms on which people take part in society is termed as Social Inclusion. In the context of APART, the aim of the project is to ensure that people have a voice in decisions which affect their lives and that they enjoy equal access to various project components, interventions and activities designed as part of APART.	Inclusion/exclusion of beneficiaries, geographical representativeness, women, disadvantaged and marginalized	Fair practice (selection criteria) to include Proportionate representation Equal opportunities Activities towards empowerment Interest generated
Participation: Refers to different mechanisms for the public to express opinions and ideally exert influence and share control over development initiatives and decisions and resources which affect them.	During planning, implementation, monitoring, evaluation of impact	Number of consultations Who participated Extent of participation Simplification of procedures to ensure participation
Transparency APART in the interest of being transparent, openly discloses the project details, implementation procedures and overall, the findings of its social accounts so that stakeholders have a good understanding of how APART performs and behaves and why it does what it does.	Information, accessibility and usability	Media and materials used for dissemination Accessibility of information Usability of information
Accountability: APART recognizes and accepts accountability by honestly and openly explaining to its stakeholders what it has done and why, for making their own judgements about continuing to support, use, trade with and work towards fulfilling objectives of APART. In general, APART is accountable to those who will be affected by its decisions or actions.	Demonstrating social responsibility through internal and external reviews and redressal of grievances	Number of reviews Result oriented redressal Ability to receive feedback and respond

Procurement Management

361. Overview: The project will follow the provisions of World Bank Procurement Framework 2016. Project Procurement Strategy for Development (PPSD) has been prepared. The project has migrated to the Online tool STEP (Systematic Tracking of Exchanges in Procurement). Given the past experience and the core capacity created in the PCU, implementation of the procurement program will be mainly lead by the ARIAS Society with all works contracts delegated to the PIU (PWD)and procurement of individual contracts upto **USD50,000 (approx.Rs.37.0 lakhs)** will be delegated to other implementing agencies. Project will continue with its successful experience with community based procurement and an innovative mobile based application is being developed for providing appropriate market and item details to the community groups.

362. The provisions in the Legal Agreements to be signed with the World Bank for this project shall precede the provisions in this PIP.

363. Procurement Risk Assessment: Considering the procurement capacity assessment carried out by the World Bank across the implementing agencies, all Procurements above **USD50,000 (approx.Rs.34.0 lakhs)** will be prior reviewed by the Procurement Unit of the ARIAS Society, which has the experience of handling the procurement of two World Bank aided projects efficiently. In addition to the existing staff handling procurements, the PCU will hire more procurement staff conversant with World Bank's procurement guidelines and experience of working in Bank-funded Projects considering the responsibility of keeping oversight in the procurements by the line departments/agencies. Overall, the ARIAS Society will be responsible for ensuring compliance with the Bank's procurement guidelines, and reporting to the Bank in a timely manner.

364. Applicable Guidelines of the World Bank: Procurement of the Project will be subject to the New Procurement Framework and Regulations of the World Bank applicable for Projects after July 1, 2016. The project procurements will be done adhering to the Procurement Regulations for IPF Borrowers as stipulated in the "PROCUREMENT IN INVESTMENT PROJECT FINANCING Goods, Works, Non-Consulting and Consulting Services, July 2016" published by the World Bank and to the extent of the provisions stipulated in the Legal Agreement/agreed with the World Bank. The Project would be subject to the Anti-Corruption Guidelines: the "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants." Published by the World Bank.

365. E-Procurement: The GoA uses the National Informatics Center (NIC) e-procurement system. An assessment of the NIC e-procurement system has been done by the World Bank and it has been found suitable for use in Bank funded projects, in accordance with Multilateral Development Banks (MDB) e-Governance projects requirements. Therefore, the same system may be used for procurements under this Project. The implementing agencies will use the e-procurement system of the Government for all contracts above Rs.20.0 lakh (about US$30,000). The implementing agencies which are not familiar with the e-procurement will be trained on the use of the system through NIC. However, the State e-procurement portal does not support consultancy assignments, e.g. Issuing of REOI and Technical Evaluation. In view of the same, all consultancy procurements will be done through the usual process

366. The Project Procurement Strategy for Development (PPSD): The Project Procurement Strategy for Development (PPSD) document has been prepared based on the World Bank's 'New Procurement Framework and Regulations for Projects after July 1, 2016' to determine the optimum procurement approach to be adopted for APART to deliver the right procurement result. The PPSD has taken into consideration inter alia the market situation, the operational context, previous experience and the risks present. The PPSD inter alia describes the procurement approach in sufficient detail for all the procurement to be undertaken during the first 18 months of the Project.

367. Procurement Plan: Based on this PPSD, a Procurement Plan has been prepared for the first 18 months of the Project and this will be agreed with the World Bank prior to negotiations. The Procurement Plan will be updated every 12 months or earlier, as needed. Items to be procured under the Project shall be as per the Procurement Plan agreed with the World Bank through the Bank's online STEP (Systematic Tracking for Exchanges in Procurement) systems. As far as thresholds for procurement and procurement methods are concerned, the provisions as laid down in this Procurement Plan, including its amendments as agreed with the World Bank, shall prevail.

368. Procurement management: The PCU will oversee all procurements related to the Project. ARIAS will be responsible for ensuring compliance with the Bank's procurement guidelines, and reporting to the Bank in a timely manner. The PCU will have dedicated procurement staff conversant with Bank's procurement guidelines and experience of working in Bank-funded Projects. The PCU will create an internal Procurement Management Unit (PMU) for coordinating the procurement and contract management aspects. Standard Bidding Documents/ Request for Proposals/Request for Bidding documents as finalized by the GoI Task Force and as amended from time to time, shall be applicable for procurements.

369. Record Keeping: All records pertaining to the award of contract, including bid notification, register pertaining to sale and receipt of bids, bid opening minutes, Bid Evaluation Reports; and all correspondence pertaining to bid evaluation, communication sent to/with the World Bank in the process, bid securities, approval of invitation/evaluation of bids by the PMU/PMC would be retained by the concerned Implementing Agencies.

370. Methods of Procurement & Related Thresholds and Prior Review Thresholds: As per the Project Procurement Strategy Document (PPSD) prepared by the project, the implementing agencies will primarily use Open National/International Approach for Goods, Works and Services with Standard Procurement Documents for RFB and RFP. RFQ will be used for small value and limited approach procurement. The project does not envisage using Initial Selection, BAFO, Competitive Dialogue and Negotiations. These thresholds shall be as per the Procurement Plan, approved by the World Bank. Following table shows the approved thresholds in a glance:

Category	**Procurement method threshold**		**Prior review thresholds**
	Threshold (IN Rs.)	**Threshold (US $)[30]**	**Threshold (US $)**
Goods, IT and Non-Consulting Services			
Request for Bids (RFB) using Open, International market approach	27 crore and above	>= 4 million	All Contract packages estimated to cost above 4 million including Direct Selection
Request for Bids (RFB) using the Open, National market approach	Under 27 crore	< 4 million	First Framework Agreement
Request for Quotations (RFQ), Community Procurement & Commercial Practices	Under 68 Lakhs	< 0.1 million	
Works (*Turnkey, Supply & Installation of plant & Equipment and PPP) *Contracts			
Request for Bids (RFB) using Open, International market approach	102 crore and above	>= 15 million	All Contract packages estimated to cost above 15 million including Direct Selection
Request for Bids (RFB) using the Open, National market approach	Under 102 Crore	< 15 million	First package for works contract for renovations of Roads, Market Warehouse and construction.

[30] 1 USD = IN Rs. 68

Category	Procurement method threshold		Prior review thresholds
	Threshold (IN Rs.)	Threshold (US $)[30]	Threshold (US $)
Request for Quotations (RFQ), Community Procurement & Commercial Practices	Under 68 lakhs	< 0.1 million	
Consulting Services			
QCBS, QBS, FBS, LCS,	Above 2 crore	>= 0.3 million	All Contract packages estimated to cost above 2 million including Direct Selection
Using the most appropriate market approach			
CQS	Under 2 crore	<= 0.3 million	
Using the most appropriate market approach			
Individual Consultant (IC)	-		
Using the most appropriate market approach	depending on nature of services		Contract packages estimated to cost above 0.4 million including Direct Selection
*__NOTE__: The Procurement Plan shall set forth those contracts which shall be subject to the Bank's Prior Review. All other contracts shall be subject to Post Review by the Bank/Association. Notwithstanding the foregoing, the Bank shall be entitled to conduct, at any time, independent procurement reviews of all the contracts financed under the Loan/Financing			

371. Delegation of procurement

a) Given the past experience and the core capacity created in the PCU, ARIAS Society, implementation of the procurement program will be mainly lead by the ARIAS Society with all works contracts delegated to the PIU (PWRD) and procurement of routine goods and equipment upto ₹.34 lakhs (equivalent of **USD50,000)** is delegated to other implementing agencies.

b) However, all individual procurements above ₹.34 lakhs (equivalent of **USD50,000)** will be prior reviewed by the ARIAS Society in respect of TOR/REOI/RFP/Technical & Financial Evaluation Report/draft contract agreement in respect of procurement of consultancy services and RFB Notice/RFB Document/Bid Evaluation Reports/Draft Contracts for procurement of non-consultancy services, goods and works .

c) Project will continue with its successful experience with community based procurement and an innovative mobile based application is being developed for providing appropriate market and item details to the community groups. However, as this project involves many new and innovative aspects, in particular those related to promoting climate-smart agriculture, enhancing farmers' access to market etc., this will be more challenging than the previous World Bank funded projects in this sector. Apart from delays in procurement process, contract management delays and disputes are potential problem areas.

d) Individual procurements above **USD50,000** shall be centralized at ARIAS Society level and shall be done by the Procurement Unit of the ARIAS Society.

e) Implementing agencies either through or under the oversight of Public Works Roads Department (PWRD) of Assam will conduct all the works procurement for the project. However, all individual procurements above ₹.34 lakhs (equivalent of **USD50,000)** by PWRD will also be prior reviewed by the ARIAS Society.

f) Individual contracts above **Rs.34 Lakhs** and upto above **Rs.1000.00 lakhs (₹.10.00 crore)** shall be finalized by the 1st Empowered Committee for Contract Finalization (ECCF) of the ARIAS Society headed by the State Project Director.

g) Individual contracts above **Rs.1000.00 lakhs (₹.10.00 crore)** shall be finalized by the 2nd Empowered Committee for Contract Finalization (ECCF) of the ARIAS Society headed by the APC & chairman, ARIAS Society.

h) Decision on the Bid/Proposal Evaluation Reports shall be finalized within maximum **45 days** from the date of bid/proposal opening in case of Open National Goods, Works and Services Procurement and award of contract shall be completed within maximum **75** days from the date of bid opening. All shopping contracts shall be finalized within **30 days** from the date of receipt of quotations.

372. Disclosure of Procurement Information

a) The following documents shall be disclosed on the ARIAS society's websites: (i) procurement plan and updates, (ii) invitation for bids for goods and works for all ICB, NCB and shopping contracts, (iii) request for expression of interest for selection/hiring of consulting services, (iv) contract awards of goods and works procured following ICB/NCB procedures, (v) list of contracts/purchase orders placed following shopping procedure on quarterly basis, (vi) shortlist of consultants, (vii) contract award of all consultancy services, (viii) list of contracts following direct contracting, or consultant qualification selection or single source selection on a quarterly basis, (ix) monthly financial and physical progress report of all contracts, and (x) action taken report on the complaints received on a quarterly basis.

b) The following details shall be sent to the World Bank for publishing in the UNDB and World Bank external website: (i) invitation for bids for procurement of goods and works using ICB procedures, (ii) request for expression of interest for consulting services with estimated cost more than **US$300,000**, (iii) contract award details of all procurement of goods and works using ICB procedures, (iv) contract award details of all consultancy services with an estimated cost of more than **US$300,000** and (v) list of contracts/purchase orders placed following Single Source Selection (SSS or CQS or DC procedures on a quarterly basis)

373. Complaint Handling Mechanism: A robust Complaint Handling Mechanism to address any procurement complaints received by the PCU/PIU will be put in place by the PMU. Upon receipt of complaints, immediate action would be initiated to acknowledge the complaint and to redress it within a reasonable timeframe. All complaints will be addressed at levels higher than the level at which the procurement process was undertaken or the decision was taken.

374. Procurement Audit: All contracts not covered under prior review by the World Bank will be subject to post review/ Audit by the World Bank and also by the Procurement Unit Officials of the PCU.

375. Procurement Manual: Further details are provided in the Procurement Plan and the Procurement Manual for the Project.

Financial Management

2. Financial Management: The Financial management of the project will be done as per the Financial Management Manual for the project and parent-child accounting system of the ARIAS Society will be core to the FM plan.

(a) **Budgeting**: The fund requirement for the project will flow through the budget of the GoA for which necessary provision will made annually in the budget for both the GoI/World Bank share and counterpart share of GoA and it will be budgeted under a separate budget head in the Government of Assam's budget under the demand for grants of the Department of Agriculture. The Budget Head ("Grant Number32--Major Head-2401 (Secretariat General Service)-Sub-Major Head – 00-Minor Head-115 (Secretariat)-Detail Head- 5211 –Grant-in-Aid (non salary)99 - others") has been created. A detailed work plan for the Project as prepared by ARIASS will be the basis for the annual budget provision in the state

budget. The Budget for the APART will be part of the overall State Budget of the GoA. SPD will be authorized as DDO by the Agriculture Deptt. to draw the funds from the allocated budget for APART.

3. Annual Work Plan (AWP): The AWP for a Financial Year (April to March) will be prepared in the preceding FY by the PMU and it be will be based on targets in the World Bank approved Procurement Plan and PAD of the APART. The PCU will place the AWP for a FY before the Governing Body of ARIAS Society for approval by the first week of December of the preceding FY. Based on the approval of the AWP by the GB, General Administrative Approval (AA) to all the schemes/activities on the AWP will be accorded by the State Project Director, ARIAS Society.

4. Bank Accounts: SPD will open Bank Account (s), as may be necessary, in any Nationalised Commercial Bank(s)/Schedule Bank(s) in the name of ARIAS Society. All these accounts shall be operated under the joint signatures of the SPD, ARIASS and the Chief Finance Officer of the PCU, ARIAS Society.

5. Sanction Procedure for activities: Based on the Administrative Approval (AA) accorded to the schemes/ activities included in the AWP, HODs will move the PCU, ARIAS Society directly for schematic/ activity wise sanction proposal(s) as per the - (a) action calendar in the AWP for which (AA) has been accorded and (b) guidelines described in procurement and financial management manual of the project (c) and such prescribed formats as established & circulated by the PCU, ARIAS Society.

6. Fund Release Procedure for activities: PCU will release funds to the identified and notified Drawing and Disbursing Officers (DDO) of APART. The DDOs as identified by APART will be notified by the concerned Administrative Departments. With the approval of the SPD, the DDOs will open and maintain a child account in the commercial Bank designated by ARIAS for making eligible payment to the contractors, suppliers, beneficiaries, commercial Banks, etc. PCU will issue fund limit order directly to the DDOs with intimation to the concerned implementing departments/directorates/HODs. All these Bank Accounts shall be operated under the joint signature of the DDO and the senior most Accounts official in the DDO's office.

7. Audit and Accounts: The project accounts will be maintained on the double entry system of accounting and will follow the cash basis of accounting. However, certain receivables and payables, which are to be specifically mentioned with reasons in the Notes on Accounts, may be accounted for on an accrual basis. The accounts of the PCU/ DDOs will be audited by Internal Auditors of ARIAS Society. The annual accounts of the PCU/ DDOs will be audited by Independent External Auditors hired by Society (a registered, reputed and professional auditing agency of Chartered Accountants), within such time as may be specified by the PCU, ARIAS Society. The annual accounts of the line department may also be audited by the Accountant General, Assam as done for all Government expenditures.

Annexure

Sub Component: A1

Annex A-1(a): GSDP Growth of Assam vis-à-vis Few Developed States (at constant prices 2004-05)

(in percentage)

Year	Assam	Maharashtra	Gujarat	Andhra Pradesh	Karnataka	Haryana
2005-06	3.40	13.35	14.95	9.57	10.51	9.2
2006-07	4.65	13.53	8.39	11.18	9.98	11.22
2007-08	4.82	11.26	11.00	12.02	12.60	8.45
2008-09	5.72	2.58	6.78	6.88	7.11	8.17
2009-10	9.00	9.30	11.25	4.53	1.30	11.72
2010-11	7.26	11.26	10.01	11.64	10.15	7.41
2011-12	5.33	4.82	7.66	7.51	3.69	8.03
2012-13	6.06	6.18	7.96	5.09	5.47	5.55
2013-14 (P)	5.87	8.71	NA	5.84	5.40	6.49

Source: Planning Commission

Growth of Industries Sector in Assam vis-à-vis Few Developed States (at constant prices 2004-05)

(in percentage)

Year	Assam	National	Maharashtra	Gujarat	Andhra Pradesh	Karnataka	Haryana
2005-06	(-) 3.53	9.72	18.93	14.64	10.05	8.37	8.49
2006-07	(-) 0.06	12.17	15.82	9.43	17.60	17.05	9.22
2007-08	0.68	9.67	11.73	10.81	10.87	10.84	6.59
2008-09	6.92	4.44	(-)1.06	6.52	7.15	5.14	3.5
2009-10	8.82	9.16	6.89	21.25	3.04	(-) 1.46	11.41
2010-11	1.61	7.55	13.64	3.16	9.97	9.53	5.60
2011-12	3.53	7.81	0.38	3.69	11.43	3.11	4.88
2012-13	3.34	0.96	2.72	7.12	(-) 0.46	0.39	4.42
2013-14 (P)	4.28	0.35	8.78	NA	2.44	2.12	3.57

Source: Planning Commission

Comparison of Plan outlay in Industries Sector in Assam vis-à-vis few other states {Rs. In Crore (% of Total outlay)}

Year	Assam	Maharashtra	Gujarat	Andhra Pradesh	Karnataka	Haryana
2007-08	42.95 (1.13%)	NA	521.15 (3.26%)	473.01 (1.55%)	435.60 (2.45%)	59.17 (1.12%)
2008-09	69.80 (1.39%)	102.94 (0.41%)	772.66 (3.68%)	571.75 (1.30%)	354.94 (1.36%)	145.53 (2.19%)
2009-10	88.18 (1.47%)	149.88 (0.42%)	752.24 (3.20%)	774.78 (2.31%)	826.06 (2.80%)	57.53 (0.58%)
2010-11	83.20 (1.09%)	222.94 (0.59%)	1045.82 (3.49%)	734.74 (1.97%)	961.53 (3.10%)	1248.92 (6.84%)
2011-12	101.57 (1.13%)	302.35 (0.59%)	1181.58 (3.11%)	652.44 (1.52%)	402.87 (1.06%)	56.60 (0.27%)
2012-13	168.16 (1.60%)	352.65 (0.50%)	2473.57 (4.85%)	784.10 (1.60%)	686.94 (1.63%)	62.26 (0.24%)

Source: Planning Commission

Share of Industries Sector in SDGP/GDP (at 2004-05 prices)

(In percentage)

Year	Assam	National	Maharashtra	Gujarat	Andhra Pradesh	Karnataka	Haryana
2005-06	25.69	27.99	31.07	39.89	24.39	29.69	32.69
2006-07	24.54	28.65	31.69	40.27	25.80	31.60	32.10
2007-08	23.57	28.74	31.83	40.20	25.53	31.11	31.55
2008-09	23.84	28.13	30.7	40.10	25.59	30.53	30.19
2009-10	23.80	28.27	30.02	43.70	25.23	29.70	30.11
2010-11	22.54	27.92	30.67	40.98	24.85	29.53	29.60
2011-12	22.16	28.22	29.37	39.47	25.76	29.37	28.74
2012-13	21.59	27.27	28.41	39.17	24.40	27.96	28.43
2013-14 (P)	21.27	26.13	28.43		23.61	27.08	27.65

Source: Planning Commission

Share of Services Sector in SDGP/GDP (at 2004-05 prices)

(in percentage)

Year	Assam	National	Maharashtra	Gujarat	Andhra Pradesh	Karnataka	Haryana
2005-06	48.94	53.74	58.51	42.89	51.33	51.70	46.54
2006-07	50.76	53.98	57.84	43.96	51.93	51.96	46.58
2007-08	52.20	54.45	57.47	44.35	51.13	52.49	48.80
2008-09	52.80	56.11	60.48	46.47	52.40	53.80	50.34
2009-10	53.29	57.09	61.83	44.31	53.67	54.21	52.72
2010-11	55.50	57.48	60.47	45.77	55.31	53.50	53.58
2011-12	55.96	57.42	62.18	47.60	55.63	55.35	54.46
2012-13	56.88	58.79	63.71	49.69	56.61	57.99	55.85
2013-14 (P)	57.47	59.93	64.03		57.34	59.42	57.12

Source: Planning Commission

Annex A-1 (b): Executive Summary of IIE Report

Salient observations

The District Industries and Commerce Centres of 16 Districts *(Kamrup Metro and Kamrup Rural have been considered as single district although there are 2 separate offices)* covered by the Study have a total 66 numbers of Industrial Estates/Industrial Areas/Commercial Estates/Commercial Areas. The percentage of Commercial Estates/Commercial Areas is 58%.

The summary of number of infrastructure facilities, industrial and commercial units in the facilities provided by the DICC of the districts covered by the Study is given in the following table.

District	IE, IA, IGC, MIE		CITI, TCPC, CWS	CE, MC	Number of Agro enterprises	Number of other enterprises
	AIIDC	DICC	DICC	DICC		
1. Kamrup	-	5	1	7	26	186
2. Nalbari	1	-	-	1	8	2
3. Barpeta	-	1	-	2	2	2
4. Nagaon	-	1	-	1	10	15
5. Morigaon	1 shared		-	1	1	7
6. Sonitpur	-	4	-	2	9	24
7. Darrang	-	2	-	3	8	14
8. Goalpara	-	1	1	2	2	4
9. Dhubri	-	1	3	2	-	-
10. Karbi Anglong	-	5	-	7	5	4
11. Cachar	-	1	-	1	6	22
12. Kokrajhar	-	-	-	-	-	-
13. Lakhimpur	-	2	-	1	2	6
14. Jorhat	-	1	-	1	5	28
15. Golaghat	-	1	-	-	7	11
16. Sivasagar	1	-	-	2	13	42
Total	2*	25*	5	33	104	367

* Excludes the shared facility

Number of agro units in DICC facilities in comparison to other types of enterprises is highly skewed (22%); the major agro enterprises found during the Study are:

a) SRD Nutrients, Sundaram Foods Pvt. Ltd,, Trinity Fructa Ltd. in Industrial Area, Mangaldoi
b) Bhogali Food Products Pvt. Ltd in Bamunimadam Industrial Estate, Guwahati
c) Holsom Bread in Bamunimadam Industrial Estate, Guwahati
d) R. N. Food Products, in Bamunimadam Industrial Estate, Guwahati
e) Yashwi Beverage Unit 1 & Unit 2 at Senchowa Industrial Estate, Nagaon
f) Swastik Food & Beverages in Cinnamora Industrial Estate, Jorhat

The rest of the agro enterprises primarily fall under the following categories:

a) Rice mills
b) Oil mills
c) Spices grinding
d) Small bakery units
e) Snacks, packaged drinking water, ice making, pickle making etc.

The following District Industries & Commerce Centres have land for possible utilization for agro based units:

a) Commercial Estate, Sonapur, Jonaki Nagar Industrial Estate, Sivasagar Industrial Estate
b) In Kokrajhar both DICC and AIIDC has lands

While the post of General Manager has been filled up in all the DICC offices, high degree of vacancy was observed for the posts of Project Manager, Functional Manager and Extension Officer. The following table summarizes the vacancy profile.

Post	Sanctioned number	Man in position	Vacancy	Vacancy percentage
1. GM	17	17	-	-
2. FM/Dy. Dir.	36	19	17	47
3. PM	14	06	08	57
4. AD (CI)	15	11	04	27
5. AM/CM	59	47	12	20
6. SI/SM	20	18	02	10
7. AIO	07	06	01	14
8. EO	140	84	56	40

14 out of 17 General Managers of DICC Offices covered by the Study shall superannuate by year 2021
Extension Officers (Industries) are vital to motivate, guide and hand hold entrepreneurs to set up enterprises. However, only 60% of the sanctions posts of Extension Officers are filled up. 71% of the existing Extension Officers are in their current position for over 10 years.
None of the officers of the District Industries and Commerce Centres covered by the Study have formal education in the field of Agriculture.
There are 29 Cold Storage units in convenient distances from the existing industrial infrastructure of the DICCs

Annex A-1 (c): Illustrative list of Dataset (for ABIP)

BEST14: Business Environment Strategic Toolkit- a dataset decision support tool based on modern business concepts (revenue &market oriented) and a set of original innovative economic indicators as business performance measures.

FIT15: Financial Improvement Toolkit-a PC software support tool aimed at decisions with strategic and operational characteristics.

PHAROS16: Business navigator used for upper level enterprise management provides easy interpretation of operational and strategic business information generates automated data import facility from external software programs.

MCCT17: Measurement Control Chart Toolkit is a software tool supporting quality assurance implementation programme, allows easy monitoring and maintenance of measurement devices and systems at industrial enterprises.

Annexure

Sub Component: A.2

Annex A-2 (a): Proposal template for existing entrepreneurs for short termsupport

(Note: Both registered and unregistered enterprises can apply)

1. Name of the entrepreneur:
2. Sex:
3. Name and address along with contact details of the firm:
4. Year of establishment:
5. Product or service:
6. Annual turnover and profits since last three years: (Please attach audited balance sheet, if available)
7. Annual production and sale for last three years
8. Investment in plant and machinery
9. Details of earlier expansion/modernization/diversification done (if any)
10. No. of employees
    a. Skilled
    b. Semi-skilled
    c. Unskilled
11. Why do you want to expand/modernize/ diversify? Please give proper justification.
12. Planned capacity/ production after expansion/modernization/diversification
13. Budget requirement
14. Sources of funding- classified by debt and grant along with amount
15. Repayment plan
16. How many new jobs will be created after expansion/modernization/ diversification?
17. Marketing plan after expansion/modernization/ diversification
18. Details of incubation support sought?
    a. Time period
    b. Nature of support
19. Justification for required incubation support
20. Confirmed monetary/ non monetary support available from other sources

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21. Merit of the proposal
    a. Is the proposal practical and justified? Yes/No
    b. Does the proposal contribute to APART objectives significantly? Yes/No
    c. Is the size of the investment commensurate with the number of jobs created? Yes/No
22. Whether to be forwarded to EDPF HO: Yes/No

Assessor-1	**Assessor-2**

Annex A-2 (b): Proposal template for start-up/new entrepreneurs for short term support

1. Name of the (prospective) entrepreneur:
2. Sex:
3. Address along with contact details:
4. Brief details of the Agri business you want to start:
5. Product or service:
6. Market size available and planned market share in first three years and five years
7. Initial capacity planned
8. Source(s) of raw materials and availability
9. Manpower required classified by skilled, semi-skilled and unskilled
10. Fund requirement
11. Own funds
12. Borrowed funds
    a. Source-1 ---------- Amount (Rs.)…….. (Grant/loan)
    b. Source-2---------- Amount (Rs.)…….. (Grant/loan)
    c. Source-2---------- Amount (Rs.)----------(Grant/loan)
13. Repayment plan for borrowed debt fund:
14. Do you have a complete business plan ready? Yes/No (If yes, please attach a copy)
15. Incubation support sought:
16. Any new technology/innovation you want to adopt in starting this new business:

For office use only

17. Merit of the proposal
    a. Is the proposal practical and justified? Yes/No
    b. Does the proposal contribute to APART objectives significantly? Yes/No
    c. Is the size of the investment commensurate with the number of jobs created? Yes/No
18. Whether to be forwarded to EDPF HO: Yes/No

Assessor-1	**Assessor-2**

Annexure
Sub-Component: A.3

Annex A-3 (a): Key Metrics of Select PE/VC Funds focusing on SMEs and Agribusiness

No.	Name	Fund manager	LPs	Launched / Closed	Size	Tenure	Financial instruments	Investment size	Target	Sector	Target return	Fee structure	External TA	Exit scenarios
1	Maharashtra State Social Venture Fund	SIDBI Venture	State government, Insurance co (Life insurance company), SIDBI	2016	125 Cr (USD20M)	7 years	Equity, Quasi-equity	7-8 Cr (USD1.2M)	Social ventures in Maharashtra	Neutral	16%	2%, 20% (after hurdle rate)	No	Trade sale, buy back etc. (No IPOs).
2	West Bengal MSME VC Fund	SIDBI Venture	State government, Insurance co, SIDBI	2015	130 Cr (USD20M)	6 years	-Do-	Up to 9 Cr (USD1.4M)	MSMEs in West Bengal	Neutral	16%	2%, 20% (after hurdle rate)	No	Trade sale, buy back etc. (No IPOs).
3	Tex Fund	SIDBI Venture	GoI, Min of Textiles	2014	41 Cr (USD6M)	7 years	-Do-	Up to 3 Cr (USD460k)	MSMEs in the textile industry and allied products and services	Textiles	16%	2%, 20% (after hurdle rate)	No	
4	Samridhi Fund	SIDBI Venture	DFID	2013	430 Cr (USD65M)	7 years	-Do-	5 - 25 Cr (USD760k - 3.8M)	Social enterprises in select states*	Neutral	16%	2%, 20% (after hurdle rate)	Small TA (TBC)	
5	India Opportunities Fund	SIDBI Venture	Indian Public Sector Banks and Insurance Companies	2011	421 Cr (USD63M)	9 years	-Do-	Up to 25 Cr (USD3.8M)	MSMEs	Neutral	16%	2%, 20% (after hurdle rate)	No	Trade sale and IPOs
6	SME Growth Fund	SIDBI Venture	Select public sector banks**	2004	500 Cr (USD76M)	8 years	-Do-	Up to 40 cr (USD6M)	SMEs, start-up	Neutral	16%	2%, 20% (after hurdle rate)	No	Trade sale and IPOs
7	SEAF India fund	SEAF	Select insurance companies, public sector banks, and private capital***	2010	USD42M	9 years	-Do-	Average USD4M	Agribusiness SMEs at the growth stage	Agribusiness	12% - 14%	2%, 20% (after hurdle rate)	No	Mostly trade sale (Both financial and strategic) and limited no. of IPOs
8	Omnivore Capital****	Omnivore Capital	Domestic banks and insurance companies	2011	260 Cr (USD40M)	8 years	Equity	Up to 25 Cr (USD3.8M)	Tech oriented start-ups in food and agriculture sector	Agribusiness	20% - 25%	2%, 20% (after hurdle rate)	No	Trade sale (Financial and strategic)
9	Aavishkaar I	Aavishkaar	NABARD, Cordaid, Care enterprise partners etc.	2001	60 Cr (USD9M)	9 years?	Equity		Social enterprises	Neutral	18-20%	2%, 20% (after hurdle rate)	No	Trade sale
10	Aavishkaar II	Aavishkaar	IFC, FMO, etc.		USD94M	9 years?	Equity	Average:US$6M	Social enterprises	Neutral	18-20%	2%, 20% (after hurdle rate)	No	Trade sale
11	India Agribusiness Fund	Rabo Equity Advisors	IFC, FMO, CDC, DEG, Rabobank etc. (International only)	2009	USD120M		Equity	Average: US$10-12M	Agribusiness companies in growth stage	Agribusiness	IRR 20%+	2%, 20% (after hurdle rate)	No	Trade sale, IPO (10 investments made - 4 to 5 exited.)
12	India Agribusiness Fund II	Rabo Equity Advisors	CDC, Rabobank etc. (International only)	2015	USD150M (target)		Equity	Average: US$15M	Agribusiness companies in growth stage	Agribusiness	IRR 20%+	2%, 20% (after hurdle rate)	No	Trade sale, IPO

Notes: No subsidies (downside, management cost etc.) reported by any funds; 1 Cr = INR 10,000,000 = US$152,000

*Bihar, Uttar Pradesh, Madhya Pradesh, Orissa, Chattisgarh, Jharkhand, Rajasthan and West Bengal

**Punjab National Bank, State Bank of India, Bank of Baroda, Bank of India, Central Bank of India, Union Bank of India, Oriental Bank of Commerce and Corporation Bank

***Life Insurance Corporation of India, Omidyar Network, Sarona Asset Management, SIDBI, Syndicate Bank, Unigrain, Union Bank of India, SEAF

****Second fund launched with target of US$70M

Annexure
Sub-Component: B-1

Annex B-1 (a): MoA for Release of Project Grant to Industry Associations in APART

(To be prepared and signed on a Stamp Paper)

Group photograph of the members

1. This Grant Agreement is made on the day …….. of …….. 20……, ……..……District (Name of the project district) of Assam.

BETWEEN

2. …… (Name of the Industrial Association under …… Cluster/Block), at …….. District (Name of the project district) of Assam, herein referred to as "First Party".

AND

3. Representative of District Industries and Commerce Centres, herein referred to as "Second Party".
4. This agreement is drawn up for the purpose of releasing the grant for …… ……(Mention the activity for which the grant is released),will help the members of the Industrial Association collectively in developing their skills for promotion of Agribusiness).
5. Out of the total amount of grant for ……..(Name of the activity) initially …… (percentage of the grant) will be borne by the First Party and …… (percentage of the grant) will be the grant from the project to the First Party.
6. Terms and Conditions:
   - First Party shall have to invest an amount of Rs……..(write in numbers) (Rupees……..write the amount in words) as their initial share portion in the form of cash/kind (tick mark the relevant option) on the activity.
   - The First Party shall have to produce documentary evidence of their investment and contribution from the members made on the activity to the Second Party.
   - The activities planned under the grant amount will have to be managed by the First Party.
   - Department of Industries & Commerce and Project Co-ordination Unit, ARIAS Society will have every right to monitor the utilization of the grant at any time and take action for illegal utilization.
   - Proper utilization registers will be maintained by the First Party and the Second Party will have every right to monitor and audit them.
   - The First Party shall be liable for timely submission of Utilization Certificates and Statement of Expenditures along with the vouchers to the Second Party.
   - Status of utilization of the assets created shall be provided to the second party by the first party regularly and when demanded.
   - Charging of user fees against utilization of the Common Service Centres lies at the discretion of the First Party.
   - Maintenance and management of the asset created using the grant, will the responsibility of the fist party.
   - Any dispute between First Party and Second Party will be resolved amicably by the State Project Director, ARIAS Society, Khanapara, Guwahati-22.

Name and Signature of the First Party
(President/Secretary of IA)

Name and Signature of the Second Party
(GM/ Addl. GM of project district DICC)

Witnesses:

- Signature of the DICC Field Executive of the particular Block.
- Two members from the General Body (one member preferably to be women)

Annexure
Sub-Component: B-2.3

Annex-B-2.3 (a): List of Agri Horti Markets to be developed

APMC/ASAMB Markets						
Dist	**Sl**	**Development Block / Agri-Cluster**	**Name of market**	**Ownership**	**Commodities**	**Area (ha)**
Dhubri	1	Gauripur	Gauripur PMY	RMC	Paddy, Black gram, Mustard	16.57
	2	Chapar-Salkosha	Chapar	RMC	Black gram, Mustard	0.49
	3	Agamoni	Halakura	RMC	Paddy, Black gram, Mustard, Vegetables	0.99
Barpeta	4	Gobardhana	Barpeta Road	RMC	Vegetables	0.8
Nagaon	5	Jugijan-Dhalpukhuri	Gandhimaidan (Hojai)	RMC	Vegetables	0.8
	6	Binakandi	Nilbagan	RMC	Paddy	4.81
Darrang	7	Pub Mangaldoi	Kharupetia PMY	RMC	Paddy	15.76
Golaghat	8	Gomariguri	Furkating PMY	RMC	Paddy	6.42
Kamrup	9	Rampur	Uparhali PMY	RMC	Cattle, Vegetables	2.89
	10	Sonapur	Maloibari	RMC	Paddy, Vegetables	0.64
Rural Haats						
Barpeta	1	Rupshi	Langla	P&RD	Paddy, Mustard, Maize, Vegetables	4.81
	2	Rupshi	Kharichala	P&RD	Maize, Wheat	4.01
	3	Mandia	Alopati Majer Char	P&RD	Mustard, Coriander, Black gram, Lentil	2.74
	4	Chenga	Kachumara	P&RD	Mustard, Coriander, Black gram, Lentil	2.26
Cachar	5	Narsinghpur	Bhaga	P&RD	Ginger, Vegetables, Goat	2.4
	6	Narsinghpur	Kabuganj	P&RD	Cattle, Vegetables, Fish	0.96
Darrang	7	Dalgaon Sialmari	Kopati	P&RD	Paddy, Mustard, Cattle	5.61
	8	Pachim Mangaldoi	Banglagarh	P&RD	Paddy, Maize, Black gram, Cattle	4.68
	9	Bechimari	Bechimari	P&RD	Paddy, Wheat, Vegetables, Chillies, Cattle	4.81
	10	Kalaigaon	Kalaigaon	P&RD	Paddy, Maize	2.58
Sonitpur	11	Gabharu	Panchmile	P&RD	Paddy, Mustard, Vegetables, Cattle	1.44
Golaghat	12	Gomariguri	Gomariguri	P&RD	Vegetables, Cattle	0.67
Jorhat	13	Majuli	Kamalabari	P&RD	Mustard, Black gram, Paddy	1.6
Morigaon	14	Bhurbandha	Bhurbandha	P&RD	Paddy, Mustard, Cattle	2.24
	15	Mayong	Mayong	P&RD	Paddy, Mustard, Maize	2.4
Dhubri	16	Gauripur	Dhubri	P&RD	Paddy, Black gram, Vegetables	1.33
Kokrajhar	17	Mahamaya	Salbari (Bagaribari)	P&RD	Black gram, Mustard, Vegetables	0.96
	18	Dotma	Nepalpara	P&RD	Paddy, Mustard, Black gram, Goat	5.61
Goalpara	19	Jaleswar	Jaleswar	P&RD	Black gram, Mustard, Wheat	1.12
	20	Krishnai	Krishnai	P&RD	Paddy, Vegetables, Cattle	2.24
	21	Khormuja	Joypur	P&RD	Wheat, Black gram, Mustard	4.01
	22	Lakhipur	Lakhipur	P&RD	Paddy, Black gram, Mustard	2.79
Kamrup	23	Samaria	Tupamari Koritola	P&RD	Mustard, Paddy, Black gram, Chilly	3.21
	24	Samaria	Nagarbera	P&RD	Mustard, Paddy, Vegetables	2.4
	25	Hajo	Nampara	P&RD	Vegetables, Paddy	0.69
	26	Chaygaon	Chaygaon	P&RD	Banana, Vegetables, Areca nut	0.83
Lakhimpur	27	Karunabari	Harmoti	P&RD	Vegetables	0.64
	28	Bihpuria	Bongalmora	P&RD	Cattle, Vegetables	1.6
Nagaon	29	Dhalpukhuri	Kharikhana	P&RD	Molasses (Gur)	0.67
Nalbari	30	Mukalmua	Peradhara	P&RD	Paddy, Mustard, Coriander, Vegetables	4.33

Annex B-2.3(b) List of Fish Markets to be developed

District	**Sl. No.**	**Development Block/ Fishery Cluster**	**Name of Whole sale Market**	**Ownership**	**Catchment area**	**Area (ha)**
Barpeta	1	Pakabetbari	Neula Pitha Fish Market	Zilla Parishad	Barpeta Sadar	0.10
	2	Bhabanipur	Bhakatardoba Fish Market	Zilla Parishad	Barpeta Sadar	0.08
Cachar	3	Tapang	Damcherra Fish Market	Market Committee	Silchar	0.15
	4	Norsingpur	Dholai Fish Market	Anchalik Panchayat	Silchar	0.10
Darrang	5	Bachimari	Kharupetia market	Town Committee	Mangaldoi	0.12
	6	Dolgaon Sialmari	Dharanipur Dolongpar market	Zila Parisad	Mangaldoi	0.07
Dhubri	7	Bilashipara	Salkata Bazar	Zila Parisad	Bilashipara	0.15
	8	Rupshi	Pipulbari Bazar	Zila Parisad		0.13
Golaghat	9	Bokakhat	Bokakhat	Town Committee	Bokakhat	0.07
	10	Sarupather	Sarupather Market	Zila Parisad	Dhansiri	0.07
Johat	11	North West Jorhat	Jorhat Chowk Bazar (Main	Zila Parisad	Jorhat	0.14

District	Sl. No.	Development Block/ Fishery Cluster	Name of Whole sale Market	Ownership	Catchment area	Area (ha)
			Market)			
Kamrup	12	Hajo	Bullot Fish Market	Gaon Panchayat	Hajo	0.10
	13	Hajo	Hajo Fish Market	Zila Parisad	Hajio	0.10
Lakhimpur	14	Nowboicha	Laluk daily Fish market	Zilla Parishad	North Lakhimpur	0.10
Nagaon	15	Binnakandi	Dabaka Fish Market	Zila Parishad	Hojai	0.25
	16	Rupahihat	Rupahi Fish Market	Zila Parisad	Nagaon	0.15
Marigaon	17	Moirabari	Bechamari Fish Market	Zila Parisad	Morigaon	0.13
Sibsagar	18	Gaurisagar	Sonari Fish Market	Municipality	Charaideo	0.15
Sonitpur	19	Balipara	Balipara Retail Fish Market	Zila Parisad	Tezpur	0.15
	20	Sootea	Biswanath Charali Wholesale Fish Market	Municipal Board	Biswanath Chariali	0.25

Annex B-2.3(c) List of Pig Markets to be developed.

Name of District	Sl. No.	Development Block/ Cluster	Name of market	Ownership	Commodities
Golaghat	1	Bokakhat	Bihora	P&RD	Pig & Agri-Horti commodities
Jorhat	2	Ujani Majuli	Jengraimukh	P&RD	Pig & Agri-Horti commodities
Nalbari	3	Bajali	Barama	P&RD	Pig & Agri-Horti commodities
Lakhimpur	4	Narayanpur	Harmoti	P&RD	Pig & Agri-Horti commodities
Morigaon	5	Bhurbondha	Morigaon	P&RD	Pig & Agri-Horti commodities
Darrang	6	Pachim Mangaldoi	Banglagarh	P&RD	Pig & Agri-Horti commodities
Sonitpur	7	Naduar	Bordikorai	P&RD	Pig & Agri-Horti commodities
	8	Balipara	Balipara	P&RD	Pig & Agri-Horti commodities
Goalpara	9	Rongjuli	Rangjuli	P&RD	Pig & Agri-Horti commodities
Karbi Anglong	10	Lumbajong	Manja	P&RD	Pig & Agri-Horti commodities
Kokrajhar	11	Dotoma	Dotoma	P&RD	Pig & Agri-Horti commodities
Kamrup	12	DImoria	Sonapur	P&RD	Pig & Agri-Horti commodities
	13	Rani	Lokhra	P&RD	Pig & Agri-Horti commodities
Sivasagar	14	Nazira	Simaluguri	P&RD	Pig & Agri-Horti commodities
	15	Sonari	Sonari	P&RD	Pig & Agri-Horti commodities

Annexure
Sub-Component: C1.1

Annex-C.1.1 (a): List of Production Cluster (Agri & Horti) to be covered under the project

IDENTIFICATION OF PRODUCTION CLUSTERS				
AGRI.-HORTI. SECTOR				
COMMODITY	DISTRICT NAME	NOS. OF CLUSTERS(BLOCKS)	AREA(ha.)	PRODUCTION (Mt.)
Maize	Darrang	5	3857	10776
Maize	Sonitpur	4	1115	5777
Maize	Nagaon	5	835	2239
Maize	Dhubri	2	375	1001
Maize	Marigaon	1	360	593
Maize	Barpeta	2	200	631
Maize	Nalbari	1	138	424
Maize	Karbi-Anglong	2	102	362
Sub Total	**8 District**	**22**	**6982**	**21803**
Mustard	Sonitpur	5	3735	2582
Mustard	Jorhat	3	2386	1890
Mustard	Darrang	3	1515	898
Mustard	Golaghat	3	1442	792
Mustard	Dhubri	5	1353	1172
Mustard	Marigaon	1	1240	668
Mustard	Sivasagar	2	400	232
Sub Total	**7 District**	**22**	**12070**	**8236**
Black Gram	Dhubri	4	3065	2516
Black Gram	Jorhat	4	2635	914
Black Gram	Darrang	3	1209	643
Black Gram	Golaghat	1	1052	682
Black Gram	Sonitpur	4	1052	882
Sub Total	**5 District**	**16**	**9013**	**5637**
Lentil	Barpeta	3	450	363
Lentil	Dhubri	3	300	315
Lentil	Marigaon	2	196	198
Lentil	Sonitpur	2	165	138
Sub Total	**4 District**	**10**	**1111**	**1014**
Pea	Golaghat	2	535	1714
Pea	Jorhat	1	471	296
Pea	Darrang	1	468	492
Pea	Sonitpur	5	375	270
Pea	Barpeta	1	150	171
Sub Total	**5 District**	**10**	**1999**	**2943**
Special Rice(Bora, Joha, Red Rice etc.)	Golaghat	4	400	119
	Cachar	2	269	361
	Dhubri	2	191	449
	Barpeta	2	175	361
	Sivasagar	1	110	231
	Karbi-Anglong	2	79	136
	Kamrup	2	40	60
Sub Total	**7 District**	**15**	**1265**	**1715**
Banana	Nagaon	4	337	6020
Banana	Darrang	2	217	3170
Banana	Lakhimpur	1	200	3289
Banana	Jorhat	1	190	1425
Banana	Kamrup	2	187	2520
Banana	Sivasagar	2	163	2668
Banana	Marigaon	1	133	2644
Banana	Goalpara	1	120	2338
Banana	Sonitpur	1	103	1846
Sub Total	**9 District**	**15**	**1649**	**25920**
Brinjal	Darrang	3	416	6128
Brinjal	Lakhimpur	2	400	8372
Brinjal	Jorhat	2	392	5470
Brinjal	Nagaon	3	321	7162
Brinjal	Marigaon	1	287	6154
Brinjal	Cachar	3	240	3096
Brinjal	Kamrup	2	187	4451
Brinjal	Goalpara	1	115	1503
Brinjal	Nalbari	1	113	1321
Sub Total	**9 District**	**18**	**2470**	**43658**
Cabbage	Darrang	5	2088	42013

IDENTIFICATION OF PRODUCTION CLUSTERS				
AGRI.-HORTI. SECTOR				
COMMODITY	**DISTRICT NAME**	**NOS. OF CLUSTERS(BLOCKS)**	**AREA(ha.)**	**PRODUCTION (Mt.)**
Cabbage	Sonitpur	6	568	9985
Cabbage	Jorhat	3	447	9241
Cabbage	Nagaon	5	430	6623
Cabbage	Lakhimpur	1	400	8270
Cabbage	Cachar	3	220	3821
Cabbage	Goalpara	2	140	2343
Cabbage	Kamrup	2	133	2026
Cabbage	Sivasagar	1	53	922
Sub Total	**9 District**	**28**	**4480**	**85244**
Cauliflower	Darrang	2	1533	48906
Cauliflower	Nagaon	5	559	13833
Cauliflower	Sonitpur	3	431	6303
Cauliflower	Jorhat	3	427	6737
Cauliflower	Cachar	3	200	2495
Cauliflower	Lakhimpur	1	200	3153
Cauliflower	Barpeta	2	150	5605
Cauliflower	Goalpara	2	140	1866
Cauliflower	Kamrup	2	133	3277
Cauliflower	Kokrajhar	1	53	53
Sub Total	**10 district**	**24**	**3827**	**92228**
Potato	Sonitpur	5	3599	25606
Potato	Barpeta	6	1907	18641
Potato	Nagaon	5	1802	14895
Potato	Lakhimpur	5	1687	26165
Potato	Golaghat	4	1528	11596
Potato	Jorhat	3	1401	10284
Potato	Nalbari	1	797	1090
Potato	Marigaon	3	762	3846
Potato	Cachar	2	570	4107
Potato	Sivasagar	2	557	2569
Potato	Darrang	2	473	4301
Potato	Kamrup	1	355	3895
Potato	Karbi—Anglong	2	103	888
Potato	Kokrajhar	1	85	847
Sub Total	**14**	**42**	**15626**	**128728**
Pumpkin	Jorhat	3	405	8177
Pumpkin	Nagaon	4	285	4336
Pumpkin	Cachar	3	260	4897
Pumpkin	Golaghat	1	213	5237
Pumpkin	Barpeta	3	170	4139
Sub Total	**5 district**	**14**	**1333**	**26786**
Tomato	Darrang	4	836	11169
Tomato	Sonitpur	4	340	8087
Tomato	Golaghat	2	287	7977
Tomato	Cachar	3	190	4350
Tomato	Nalbari	1	147	5032
Tomato	Barpeta	2	146	3466
Tomato	Kamrup	2	107	3982
Tomato	Sivasagar	2	101	1575
Tomato	Kokrajhar	1	68	567
Sub Total	**9 District**	**21**	**2221**	**46207**
Onion	Dhubri	1	200	656
Onion	Sonitpur	1	160	762
Onion	Barpeta	2	101	752
Onion	Nalbari	1	99	462
Onion	Goalpara	1	87	241
Sub Total	**5 district**	**6**	**647**	**2873**
Ginger	Lakhimpur	1	400	3125
Ginger	Golaghat	1	327	2930
Ginger	Sonitpur	2	181	1752
Ginger	Karbi—Anglong	1	52	556
Sub Total	**4 District**	**5**	**959**	**8363**
Total	**All districts**	**268**	**65652**	**501356**

Annex-C.1.1 (b): Spread of Production Cluster (Agri & Horti).

District	Blocks/Clusters	Commodity	Area in Ha	Production in MT
Darrang	Dalgaon –Sialmari	Maize	1258	2682.24
		Cabbage	810.67	16311.42
		Cauliflower	745.33	23772.41
		Tomato	432	4422.17
		Brinjal	174.67	2613.24
		Banana	163.33	2389.57
	Sub-Total		3584	52191.04
	Bechimari	Cauliflower	788	25133.26
		Cabbage	777.33	15640.72
		Pea	468	491.87
		Mustard	414.67	245.9
		Maize	376.67	1052.41
		Brinjal	181.33	2703.44
	Sub-Total		3006	45267.6
	Siphajhar	Maize	948.67	3203.79
		Mustard	793.33	470.45
		Black Gram	673.33	358.21
		Cabbage	160	3219.36
		Tomato	86.67	1322.09
	Sub-Total		2662	8573.9
	Pachim Mangaldoi	Maize	806.67	2533.23
		Mustard	306.67	181.85
		Black Gram	306.67	163.15
		Tomato	230.67	3943.48
		Cabbage	180	3621.78
		Potato	180	1635.48
		Brinjal	60	811.8
	Sub-Total		2070.67	12890.76
	Kalaigaon	Maize	466.67	1303.87
		Potato	293.33	2665.23
		Banana	53.33	780.27
	Sub-Total		813.33	4749.36
	Pub Mangaldoi	Black Gram	229.33	122.01
		Cabbage	160	3219.36
		Tomato	86.67	1481.65
	Sub-Total		476	4823.02
Total	6 Blocks		12612	128495.68
Sonitpur	Bihaguri	Mustard	1121.73	775.68
		Potato	556	3955.38
		Cauliflower	228.67	3346.54
		Black Gram	144	117.5
		Pea	128	100.35
		Lentil	114.67	96.43
		Cabbage	90	2337.02
	Sub-Total		2383.07	10728.9
	Dhekiajuli	Mustard	930.13	643.19
		Potato	723.33	5145.79
		Ginger	130	490.43
		Maize	125.33	649.23
		Cabbage	92	1875.05
		Tomato	82	1950.37
		Cauliflower	78.67	1151.29
		Lentil	50	42.05
	Sub-Total		2211.46	11947.39
	Gabharu	Mustard	738.67	510.79
		Potato	578.13	4112.84
		Cabbage	114.67	2337.02
	Sub-Total		1431.47	6960.65
	Baghmara	Potato	1089.33	7749.52
		Tomato	50	1189.25
		Pea	50	35.75
	Sub-Total		1189.33	8974.52
	Balipara	Mustard	664	459.16
		Maize	125.33	649.23
		Black Gram	113.33	135.27
		Cabbage	92	542.17
		Ginger	50.53	1261.65
	Sub-Total		1045.2	3047.48

District	Blocks/Clusters	Commodity	Area in Ha	Production in MT
	Borsola	Maize	720.67	3733.05
		Onion	160	762.4
		Banana	102.67	1845.95
		Tomato	88	2093.08
	Sub-Total		1071.33	8434.48
	Sootea	Potato	652.53	4642.12
		Pea	50	39.2
	Sub-Total		702.53	4681.32
	Pub –Choiduar	Mustard	280	193.62
		Black Gram	260.93	193.62
		Cabbage	102.67	1331.56
		Pea	93.33	53.2
	Sub-Total		736.94	1772
	Naduar	Black Gram	533.33	435.2
		Pea	53.33	41.81
	Sub-Total		586.67	477.01
	Nagsankar	Maize	144	745.92
		Cauliflower	123.33	1804.98
		Tomato	120	2854.2
		Cabbage	76.67	1562.54
	Sub-Total		464	6967.65
Total	10 Blocks		11822	63991.4
Jorhat	Ujoni Majuli Development Block	Black Gram	1200	416.4
		Mustard	1200	948.4
		Potato	486	3568.21
		Banana	190	1425
		Cauliflower	80	1261.6
		Cabbage	80	1653.76
	Sub-Total		3236	9273.37
	Majuli Dev. Block	Mustard	880	698.72
		Potato	796.67	5849.13
		Black Gram	679.33	235.73
	Sub-Total		2356	6783.58
	Dhekorgorah Dev. Block	Pea	470.67	295.58
		Black Gram	436.67	151.52
		Brinjal	330.67	4617.76
		Cabbage	200	4134.4
		Cauliflower	200	3154
		Pumpkin	156.67	3186.6
		Potato	118	866.36
	Sub-Total		1912.67	16406.22
	Koliapani Dev. Block	Black Gram	319.2	110.76
		Mustard	306.13	243.07
		Pumpkin	189.2	3848.33
		Cabbage	167.07	3453.6
		Cauliflower	147.2	2321.34
		Brinjal	61.07	852.8
	Sub-Total		1189.87	10829.9
	Titabor Dev. Block	Pumpkin	59.07	1141.75
	Sub-Total		59.07	1141.75
Total	5 Blocks		8753.6	44434.82
Golaghat	Golaghat West Dev. Block(Bokakhat)	Mustard	1151.2	663.34
		Black Gram	1052.09	681.76
		Potato	374	2838.66
		Pea	370	474.34
	Sub-Total		2947.29	4658.09
	Kakodonga	Ginger	326.67	2930.2
		Pumpkin	213.33	5237.33
		Mustard	197.33	87.62
		Pea	165.33	165.33
		Rice(Joha)	100	20.81
	Sub-Total		1002.67	9513.52
	Golaghat East Dev. Block(Padumoni)	Potato	617.6	4687.58
		Tomato	136.67	3238.32
		Mustard	93.33	41.44
	Sub-Total		847.6	7967.34
	Gomariguri	Potato	195	1480.05
		Tomato	150	4739
		Rice(Joha)	100	20.81
	Sub-Total		445	6239.86

District	Blocks/Clusters	Commodity	Area in Ha	Production in MT
	Golaghat North Dev. Block(Dergaon)	Potato	341.2	2589.71
		Rice(Bora)	100	44.6
	Sub-Total		441.2	2634.31
	Golaghat South Dev. Block(Sarupathar)	Rice(Joha)	100	32.71
	Sub-Total		100	32.71
Total	6 Blocks		5783.76	31045.83
	Nayeralga	Black Gram	1615	1400.21
	Sub-Total		1615	1400.21
	Birsing Jarua	Black Gram	850	642.95
		Maize	175	467.25
		Lentil	150	158.55
	Sub-Total		1175	1268.75
	Gauripur	Mustard	250	205.05
		Onion	200	656
		Black Gram	200	173.4
		Lentil	100	105.7
		Rice(Special)	79.33	132.07
	Sub-Total		829.33	1272.22
Dhubri	Chapar-Salkocha	Mustard	460	415.38
		Rice(Special)	112	316.96
	Sub-Total		572	732.34
	South Slamara	Black Gram	400	299.2
	Sub-Total		400	299.2
	Agomoni	Maize	200	534
		Mustard	150	122.55
	Sub-Total		350	656.55
	Mahamaya	Mustard	300	270.9
		Lentil	50	52.25
	Sub-Total		350	323.15
	Rupshi	Mustard	193	158.24
	Sub-Total		193	158.24
Total	8 Blocks		5484.33	6110.65
	Batadrava	Potato	484.87	3027.5
		Maize	281.07	703.51
		Cauliflower	194	4800.14
		Brinjal	147.46	3289.39
		Banana	110.8	1980.44
		Cabbage	53.33	820.91
	Sub-Total		1271.53	14621.89
	Juria	Potato	529	4765.58
		Maize	110.8	277.33
		Cauliflower	75.6	1870.57
		Cabbage	72.4	1114.38
	Sub-Total		787.8	8027.87
	Laokhowa	Potato	289.33	2606.51
		Cabbage	130.13	2003.01
		Cauliflower	127.07	3144.01
		Banana	112.27	2006.65
		Brinjal	86.93	1939.22
	Sub-Total		745.73	11699.4
Nagaon	Kaliabor	Potato	314	2828.72
		Brinjal	86.67	1933.27
	Sub-Total		400.67	4761.99
	Dhalpukhuri	Maize	194	633.8
		Cauliflower	111.07	2748.12
		Cabbage	66.8	1028.19
	Sub-Total		371.87	4410.11
	Pachim Kaliabor	Potato	185	1666.6
		Banana	57.6	1029.54
	Sub-Total		242.6	2696.15
	Kathiatoli	Maize	147.47	369.11
		Pumpkin	50	1613.78
	Sub-Total		197.47	1982.89
	Bajiagaon	Cabbage	107.6	1656.18
	Sub-Total		107.6	1656.18
	Khagorijan	Maize	101.87	254.97
	Sub-Total		101.87	254.97
	Jugijan	Pumpkin	85	1302.35
	Sub-Total		85	1302.35
	Pakhimoria	Pumpkin	78	1561.88

District	Blocks/Clusters	Commodity	Area in Ha	Production in MT
	Sub-Total		78	1561.88
	Barhampur	Pumpkin	72	1160.79
	Sub-Total		72	1160.79
	Raha	Banana	56.13	1003.33
	Sub-Total		56.13	1003.33
	Binakandi	Cauliflower	51.33	1270.14
	Sub-Total		51.33	1270.14
Total	14 Blocks		4569.59	55107.6
	Bhawanipur	Potato	500	4887.5
		Maize	150	473.4
		Lentil	150	108.9
		Tomato	95	2439.13
	Sub Total		895	7908.93
	Chakchaka	Potato	225	2199.38
		Lentil	200	145.2
		Pea	150	171.3
		Cauliflower	75	2615.83
		Onion	50	451.13
	Sub Total		700	5582.83
	Pakabetbari	Potato	460	4496.5
	Sub Total		460	4496.5
	Chenga	Potato	180	1759.5
		Rice(Red, Glutinous, Bora Rice)	75	154.5
		Pumpkin	55	1379.57
Barpeta		Onion	50	300.75
	Sub Total		360	3594.32
	Bajali	Potato	330	3225.75
	Sub Total		330	3225.75
	Mandia	Potato	212	2072.3
		Lentil	100	108.9
	Sub Total		312	2181.2
	Gobordhana	Cauliflower	75	2989.52
		Pumpkin	50	1128.74
		Tomato	50	1027
		Maize	50	157.8
	Sub Total		225	5303.06
	Barpeta	Rice(Red, Glutinous, Bora Rice)	100	206
	Sub Total		100	206
	Sarukhetri	Pumpkin	66.33	1630.4
	Sub Total		66.33	1630.4
Total	9 Blocks		3448.33	34128.97
	Karunabari	Cabbage	400	8270.4
		Ginger	400	3124.8
		Brinjal	300	6279.3
		Banana	200	3289
		Cauliflower	200	3153
		Potato	172.8	2592
	Sub-Total		1672.8	26708.5
Lakhimpur	Naoboicha	Potato	326.4	4896
		Brinjal	100	2093.1
	Sub-Total		426.4	6989.1
	Boginadi	Potato	556.67	8820
	Sub-Total		556.67	8820
	Telahi	Potato	366.67	5735
	Sub-Total		366.67	5735
	Bihpuria	Potato	264.67	4122
	Sub-Total		264.67	4122
Total	5 Blocks		3287.2	52374.6
	Mayong	Mustard	1240	668.36
		Potato	371	1872.44
		Maize	360	593.28
		Brinjal	286.67	6153.59
		Banana	133.33	2644.13
Morigaon		Lentil	93.33	94.17
	Sub-Total		2484.33	12025.97
	Bhurbandha	Potato	216	1090.15
	Sub-Total		216	1090.15
	Moirabari	Potato	175	883.23

District	Blocks/Clusters	Commodity	Area in Ha	Production in MT
	Sub-Total		175	883.23
	Lahorighat	Lentil	102.67	103.59
	Sub-Total		102.67	103.59
Total	4 Blocks		2978	14102.94
Cachar	Palonghat	Potato	450	3242.7
		Pumpkin	80	1506.64
		Brinjal	80	1032
	Sub-Total		610	5781.34
	Narsingpur	Rice(Special Rice)	150	343.5
		Cabbage	80	1389.36
		Brinjal	60	774
		Cauliflower	60	748.44
	Sub-Total		350	3255.3
	Borkhola	Brinjal	100	1290
		Tomato	80	1831.6
		Cabbage	80	1389.36
		Cauliflower	80	997.92
	Sub-Total		340	5508.88
	Udharband	Pumpkin	120	2259.96
		Potato	120	864.72
		Cabbage	60	1042.02
	Sub-Total		300	3917.3
	Kalain	Rice(Special Rice)	116	266.4
		Tomato	50	1144.75
	Sub-Total		166	1411.15
	Katigorah	Rice(Special Rice)	153	350.37
	Sub-Total		153	350.37
	Silchar	Tomato	60	1373.7
		Cauliflower	60	748.44
	Sub-Total		120	2122.14
	Banskandi	Pumpkin	63.33	1129.98
	Sub-Total		63.33	1129.98
Total	8 Blocks		1949.33	22369.63
Nalbari	Barkhetri	Potato	796.67	1090.15
		Tomato	147.33	5032.46
		Maize	138	423.66
		Brinjal	112.67	1321.13
		Onion	99.33	461.9
	Sub-Total		1294	8329.3
Total	1 Block		1294	8329.3
Sivasagar	Gaurisagar	Potato	390	1799.59
		Mustard	200	116
		Tomato	50.67	787.56
	Sub-Total		640.67	2703.15
	Sivasagar	Mustard	200	116
	(Kheluwa)	Potato	166.67	769.06
		Rice(Joha)	110	231
		Banana	82.85	1357.5
	Sub-Total		559.52	2473.55
	Demow	Banana	80	1310.8
		Cabbage	53.33	921.6
		Tomato	50	787.56
	Sub-Total		183.33	3019.96
Total	3 Blocks		1383.52	8196.66
Goalpara	Jaleswar	Brinjal	115.33	1503.48
		Cabbage	73.33	1227.16
		Cauliflower	66.33	785.87
	Sub-Total		255	3516.51
	Lakhipur	Cauliflower	73.33	1080.57
		Cabbage	66.67	1115.6
	Sub-Total		140	2196.17
	Rongjuli	Banana	120	2338.32
	Sub-Total		120	2338.32
	Kharmuza	Onion	86.66	240.8
	Sub-Total		86.66	240.8
Total	4 Blocks		601.66	8291.79
Kamrup	Hajo	Potato	355	3894.53
		Cauliflower	66.67	1638.47
		Cabbage	66.67	1013.2
		Tomato	53.33	1991.09

District	Blocks/Clusters	Commodity	Area in Ha	Production in MT
		Brinjal	53.33	1271.84
		Rice(Red Rice)	13.33	29.87
	Sub-Total		608.33	9838.99
	Goroimari	Cauliflower	66.67	1638.47
		Cabbage	66.67	1013.2
		Tomato	53.33	1991.09
	Sub-Total		186.67	4642.76
	Sualkuchi	Brinjal	133.33	3179.6
	Sub-Total		133.33	3179.6
	Chaygaon	Banana	133.33	1938.13
	Sub-Total		133.33	1938.13
	Boko	Banana	53.33	581.44
	Sub-Total		53.33	581.44
	Chayani Barduar	Rice(Glutinous & Joha)	26.67	29.87
	Sub-Total		26.67	29.87
Total	6 Blocks		1141.67	20210.79
Karbi-Anglong	Lumbajong	Ginger	52	555.72
		Maize	51.33	191.01
	Sub-Total		103.33	746.74
	Rongkhang	Potato	51.33	441.11
		Maize	50.67	170.65
	Sub-Total		102	611.75
	Langsomepi	Potato	52	446.84
	Sub-Total		52	446.84
	Howraghat	Rice(Special Rice)	42.67	72.96
	Sub-Total		42.67	72.96
	Samelangso	Rice(Special Rice)	36.67	62.7
	Sub-Total		36.67	62.7
Total	5 Blocks		336.67	1940.98
Kokrajhar	Kokrajhar	Potato	84.93	846.62
		Tomato	68	567.44
		Cauliflower	53.33	810.29
	Sub-Total		206.27	2224.34
Total	1 Block		206.27	2224.34
Grand Total	95 Blocks		65651.92	501356

Annex-C.1.1 (c): Value Chain Development Plans (VCDPs) of Agri-Horti Commodities

Value Chain Development Plan (VCDP) for Rice

Introduction:

Assam is the region with the higher density of rural poverty, higher crop yield gaps and food and nutritional insecurity compared to other parts of the country. Rice is an important crop and staple food for the millions of people in the region. Low productivity of rice-based systems of this region is mainly because of abiotic and biotic stresses due to rainfall nature of farming, poor access to appropriate cultivars, poor access to knowledge and information, variable monsoon and poor agronomy including late sowing/planting of inappropriate age of seedling, limited availability of irrigation water, poor weed and nutrient management and low input use.

Total rice area in Assam is approximately 2.5 million ha. More than 50% of the growing areas are prone to various abiotic stresses including flood/submergence and drought. Almost 0.8 and 0.2 million rice area in the state is frequently affected by flood and drought respectively. Rice production in these areas is not only low but also fragile. Farmers in the stress prone areas use little inputs for the fear of losing not only crop but also inputs in case there is flood or drought. It further adds to low productivity. In addition, these farmers are also affected by rising scarcity of labour, climate change, and rising production costs. A huge potential exists to bridge the yield gap, de-risk farming in these risky and fragile environments, and to improve the income.

Post harvest management, processing system, value added processed, food production, marketing etc. in Assam has been one of the most traditional and major concerns of Assam Agri. Economy. No proper supply chain frame work for it has been developed.

With holistic approach with agri. business objective in production and marketing of rice and its processed food, overall life of small and marginalized farming communities in Assam can be improved a lot.

Area, Production and Productivity of Rice in APART Districts of Assam

Sl.	District	Area (ha)	Production (t)	Productivity (t/ha)
1	Baksa	99920	219819	2042
2	Barpeta	135966	262510	1813
3	Bongaigaon	52849	115939	2223
4	Cachar	107882	245893	2119
5	Chirang	45525	72856	1691
6	Darrang	69073	173092	2475
7	Dhemaji	85539	131692	1482
8	Dhubri	86058	236461	2008
9	Dibrugarh	74728	129091	2035
10	Dima Hasao	14700	34511	1513
11	Goalpara	84268	193831	2076
12	Golaghat	123624	276255	2124
13	Hailakandi	45343	126300	2426
14	Jorhat	91893	176550	1634
15	Kamrup (M)	29210	64756	2131
16	Kamrup (R)	113627	260897	2173
17	Karbi Anglong	127996	218189	1637
18	Karimganj	77402	143230	1720
19	Kokrajhar	108382	212989	2046
20	Lakhimpur	124166	260743	1831
21	Morigaon	89922	214226	2377
22	Nagaon	201733	410571	2106
23	Nalbari	76375	184445	2300
24	Sibsagar	97859	206090	2206
25	Sonitpur	173087	380946	2381
26	Tinsukia	63513	105543	2003
27	Udalguri	94657	165220	1924
Total		**2495297**	**5222645**	**Av=2018**

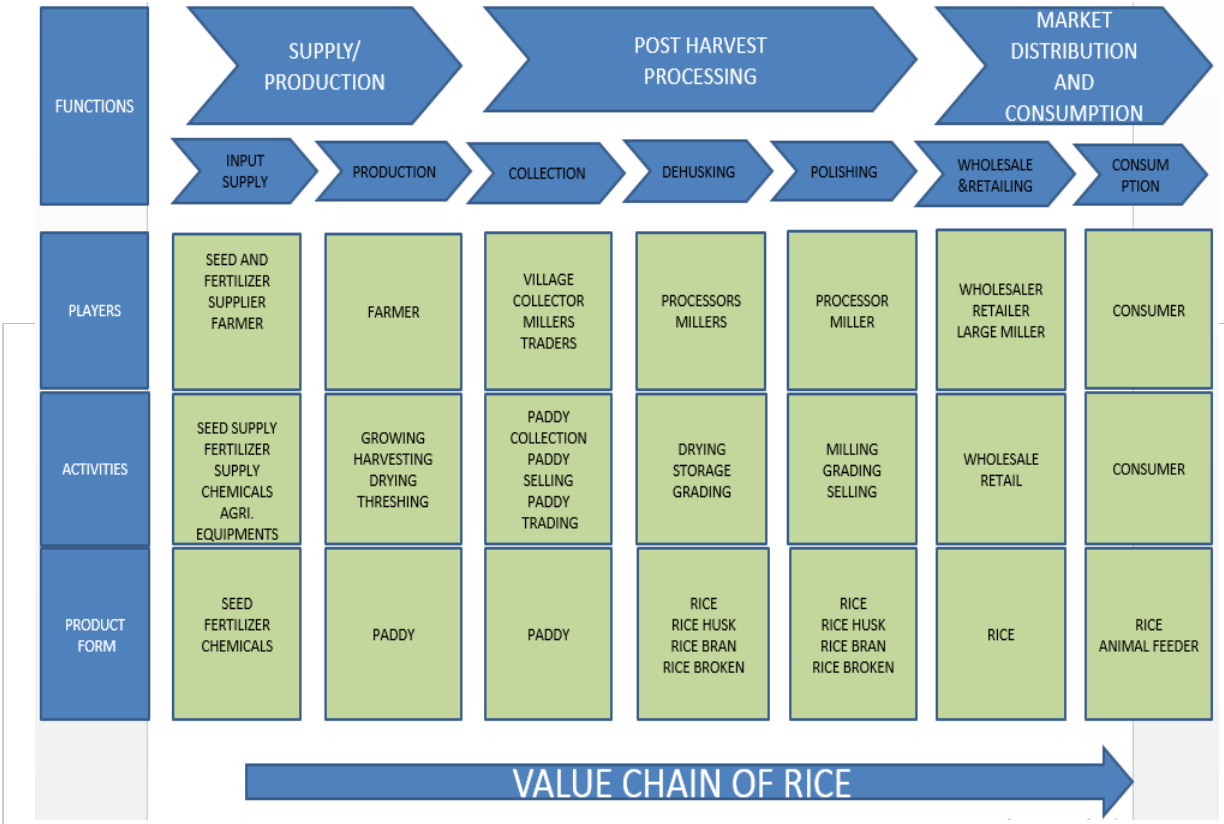
APART | Non APART

Rice Clusters:

Rice being the predominant crop covering 61% of the total gross cropped area and rice shelling being the main agro-processing industry (60% of total industrial units) has been selected and will be taken as one important commodity in all APART plotted production blocks (clusters).

Production of speciality rice (Bora, Joha, red rice) will be taken up in the identified blocks (clusters).

Rice Value Chain- Actors and Activities:



Inputs Availability:

- Role of input suppliers in Rice value chain is minimal as most of the farmers cultivate the local varieties, the seeds for which are self-generated.
- Use of fertilizers and pesticides are low in rice cultivation as the farmer tries to keep his cost of production low, hence dependence on the inputs is low.
- Major revenue of the input suppliers was generated from other high value crops like vegetables (hybrid seeds, chemicals, fertilizers, equipment etc.) and Maize (hybrid seeds, fertilizers)
- Input supplier is compelled to buy his goods at a higher price from the bulk dealers (in case of fertilizers). In the process the high price is transferred to the farmers/producers.
- Government subsidized inputs meant for the farmers are often channeled to the input suppliers. These are again sold to the farmers at a markup price.
- On farm training, demonstrations and advisory service are implemented by corporate brands along with the input suppliers. This is a win-win situation to both the players. This may lead situation that input dealer will push the product of the company whose demonstration he has attended.

Adoption of Package of Practices:
Normal *Ahu* (autumn rice) (direct seeded)

S. No.	Practice	Recommendation	Farmer Practice
1	Varieties	Semi Dwarf: Govind, IR-50, IR-36, Rasi Tall: Banglami, Rangadoria, Ahu Joha, Maibee, Dimroo Rainfed/Upland/Jhum: Maizu Biron, Inglongkiri, Dehangi, Haccha	IR-36, Rasi
2	Soil type	Medium to sandy texture overlying a silty clayey sub-soil	Sandy loam/ Clay loam/ Clay whichever available
3	Sowing time	Mar-April	Many farmers use late sowing
4	Land preparation	3-4 ploughings, laddering	3-4 ploughings
5	Age of seedling	25 – 30 days	Many farmer use inappropriate age of seedling
6	Manures	FYM @ 10 t/ha	Depending on availability
7	Fertilizers (Kg/ha)	Semi dwarf Tall Urea 88 Kg/ha 44 Kg/ha SSP 125 Kg/ha 62 Kg/ha MOP 32 Kg/ha 17 Kg/ha	Farmers on average use less than half dose
8	Seed rate	75 Kg/ha (line sowing) 105-110 Kg/ha (broadcasting)	Same as recommended
9	Intercultural operations	Weeding after 2-3 weeks of sowing using wheel hoe or dryland weeder Repeat at 4-5 weeks Pretilachlor @ 750 g/ha at 3 DAS Grubber 30 DAS	Do not adopt fully for scarcity of labor, rising production cost etc.
10	Insect Pests	Erect 50 'T'-perches per ha 2 ft (60 cm) above crop canopy as roosting site for insectivorous birds, which are to be removed before flowering in order to prevent activity of granivorous birds	Some farmers only go for such techniques having ITK knowledge
11	Root-knot Nematodes	Carbofuran 3 G @ 3g/m^2 at the time of sowing	Little adoption
12	Diseases		
a.	Blast	Tolerant varieties- Govind, Cauvery, IR 36 Seed treatment carbendazim or thiophenate methyl @ 1g/lit of water at tillering stage ediphenphos @ 1 ml/lit of water at panicle initiation and panicle emergence	Adoption poor
b.	Sheath blight	NSKE 3ml/l	Low adoption
c.	Bacterial blight	Tolerant varieties –Govind, IR-36 Top dress with 10 kg of K_2O /ha or apply 5 kg of K_2O/ha in the form of foliar spray of 3% solution.	Low adoption
d.	Brown spot disease	Seed treatment with Carbendazim mancozeb @ 2.5 g/litre or ediphenphos @ 1 ml/litre or carbendazim @ 1g/litre at initial symptom development	Low adoption

Transplanted Normal *Ahu* Rice (autumn rice)

S.No.	Practice	Recommended	Farmer Practice
1	Varieties	Govind, IR-50, Rasi, IR-36, Lachit, Chilrai, Sonamukhi, Luit, Gopinath, Haccha	Not sufficiently available farmers use some other popular varieties
2	Soil	Heavy to medium textured	As available
3	Seed treatment	Mancozeb, Carbendazim, Captan	Poor adoption
4	Nursery sowing seed rate	0.65-1kg/bed (10m*1.25 m)	Do not maintain the size
5	Field preparation	Ploughing at least 21 days before transplanting Secondary irrigation 10-12 days before transplanting Final puddling: 4-5 days before transplanting	Some farmers only adopt this time
6	Manures	Well rotten FYM 10 t/ha	Seldom use full dose
7	Fertilizers (Kg/ha)	Urea 88 Kg/ha SSP 125 Kg/ha MOP 32 Kg/ha	Average use is less than half as they can't afford to buy
8	Transplanting time (month)	April-May	Yes
9	Transplanting	3 seedlings per hill at should be 20 × 15 cm	Do not maintain strictly
10	Gap filling	Within 7-10 days of transplanting	Yes
11	Water management	5 cm irrigation water 3 days after	Yes, but mostly rainfed

S.No.	Practice	Recommended	Farmer Practice
		disappearance of ponded water	
12	Insect pests, nematode, diseases	Same as direct seeded ahu	Farmers use pesticides that are available at Market

Sali rice (winter)

S. No.	Practice	Recommended	Farmer practice
1	Varieties	Semi dwarf: IR-36, Jaya, Pankaj, Lakhimi, Bahadur, Piolee, Kushal, Maniram, Ranjit, KMJ 10-2-2, TTB101-15 Glutinious: Rangalee, Bhogalee, KMJ 3-144, Multiple Cropping: Satya, Basundhara Tall: Mashuri, Swarnaprova, Scented: Keteki Joha Post flood transplanted: Manohar Sali, Biraj, Andrewsali, Solpona, Prasad bhog, KMJ 1-19-1, Directed seed late Sali: Luit, Kapili, Disang Staggered planting: Prafulla, Gitesh Submergence tol: Jalashree, Jalkunwari	All varieties are not sufficiently available 'Ranjit' is widely popular. Bahadur is also other popular variety.
2	Seed treatment	Same as above	
3	Nursery, sowing, seed rate	Sowing time – June – July, others same as above,	Many farmers go for late sowing Mat nursery is not in use
4	Field preparation	Same as Ahu	Rain water almost available so water management is not there
5	Manures	Same as Ahu	
6	Fertilizers	Semi dwarf – Urea Kg/ha SSP Kg/ha MOP Kg/ha 132 125 66 Tall - 44 62 16	Same as in Ahu, Many farmers use split dose of urea, Farmers do not use fertilizer at all in flood possible areas for uncertain yield.
7	Inter culture operations, gap filling	Same as Ahu	Same as shown in Ahu
8	Plant protection measures	Same as Ahu	Same as shown in Ahu

BAO Rice (deep swater rice)

S.No.	Practice	Recommended	Farmer Practice
1	Varieties	Maguri, Panikekua, Padmapani, Panindra, Padmanath, Rayada 16-06, Amona, Negheri, Kakua, Salibadal, Dholabadal	Farmers use their own chosen local varieties apart from recommended varieties if available
2	Seed treatment	Both dry & wet method, Same as Ahu	Same as Ahu
3	Fertilizers	Application of neem coated Urea @ 30 Kg N/ha in two equal splits as basal and maximum	Farmers seldom use fertilizers
4	Plant protection Nematode, (Field rats)	Seldom used by farmers	

Adoption of Package of practices BORO Rice (summer paddy)

S.No.	Practice	Recommended	Farmer Practice
1	Varieties	Boro1, Boro 2, culture 1, kalinga 3, Krishna, Masuri, IR – 50, Cauvery, Banglami, Joymati, Bishnuprasad, Jyoti prasad	Farmers grow locally adaptable popular varieties. They also use Masuri, Cauvery and other recommended varieties if available
2	Sowing time	Nov, Dec, Jan	Same, Many farmers use late sowing
3	Seed treatment	Same as in Ahu, Sali	Same as in Ahu, Sali
4	Seed bed preparation	Same as in Ahu, Sali	Same as in Ahu, Sali
5	Preparation of seedlings for initial plant protection in the main field	Root dip treatment in 0.02% Solution of chloropyriphos	Seldom practice
6	Field preparation	Same as in Ahu, Sali	Adoption same as in Sali
7	Fertility Management	Same as in Sali	Adoption same as in Sali
8	Gap filling after transplanting	Same as in Sali	Adoption same as in Sali
9	Water Management	Irrigation water is to be maintained 5 $\pm$ 2 cm. of standing water	Farmers go for irrigation wherever possible
10	Inter culture operations	Same as in Ahu	Adoption same as in Ahu
11	Plant protection measure	Same as in Ahu	Same as in Ahu

Hybrid 'BORO' Rice

S.No.	Practice	Recommended			Farmer Practice
1	Varieties	Pro Agro 6444, DRRM 1, KRH 2			Farmers Hybrid Var acceptance is poor
2	Fertilizer	Urea Kg/ha 217	SSP Kg/ha 375	MOP Kg/ha 100	Full dose of fertilizer is not applied by farmers

All other practice is same as in HYV/normal Boro Rice early Ahu (direct seeded)

S.No.	Practice	Recommended	Farmer Practice
1	Varieties	Semi dwarf – IR-50, Bala, DR92, Piesa 2-21, Cauvery, Rasi, IR-36, culture 1, Luit, Kapilee Tall – Ch63, Banglami, Ronga doria, Dubaichenga, Ahu-jaha, Dangranga, Kalasopila, Ihajit, Panjasali, Fapori Ahu, Koliapori, Hasa Rumra, Guhi, Kolamanik, Koimurali, Nilajee, Harin	Farmers use recommended varieties if available. Otherwise they go for own chosen varieties
2	Seed rate	Same as in Ahu (direct seeded)	Same

Other practices are same as in BORO Rice

Adoption of Package of practices Transplanted Early Ahu

S.No.	Practice	Recommended	Farmer Practice
1	Semi-dwarf variety Tall Variety	Pusa 2-21, Rasi, Saket-4, IR-50, Govind, DR-92, IR-36, Cauvery, Ratna, Krishna, Joya, IR-8, culture -1, Luit, Kapilee Panja Sali, Koijapori, Laujuli, Hasakumra	Farmers adopt locally adaptable own chosen varieties. They also use these recommended varieties if readily available in their locality

Other practices are same as in BORO.

Cost of cultivation and Marketing:

1. Winter Paddy (Sali)(Cost of cultivation for 1 Ha. Area)

Cost/Revn items	Units	Quantity	rate	Total in INR
LABOUR				
Preparation of nursery	Man day	2	220.00	440.00
Land preparation	DO	10	220.00	2200.00
Sowing	DO	1	220.00	220.00
Uprooting of seedlings	DO	5	220.00	1100.00
Transplanting	DO	20	220.00	4400.00
Weeding	DO	0	0.00	0.00
Manure	DO	5	220.00	1100.00
Harvesting	DO	22	220.00	4840.00
Post harvest	DO	15	220.00	3300.00
Tractorization	per ha	1	2000.00	2000.00
Total Labour		**80**		**19600.00**
Inputs				
Seed	Kgs	40	38.00	1520.00
Urea	Kg	20	6.00	120.00
DAP	kg	15	23.00	345.00
Muriate of Potash	kg	16	12.00	192.00
Pesticide	LS			750.00
Total Inputs				**2927.00**
TOTAL COSTS(INR)				**22527.00**
Production(paddy)	**3 MT**			
Sale Price	**Rs. 14100/MT**			
Income from Production (INR)		**3**	**14100.00**	**42300.00**
Net Profit(INR)				**19773.00**

Total Cost per ha : 22527.00
Expected production per ha : 3 MT/Ha
Expected price : Rs. 14100.00/MT.
Expected Income : Rs. 42300.00/Ha.
Cost Benefit Ratio : 1:1.87
N.B.: 10% variation in inputs cost may be accepted

Marketing of Rice:

Business of rice has been one of the most traditional and major concerns, but a proper market chain framework has to be developed. Most of their operations are very traditional. Most of the farmers being poor, sell their paddy to rice processing companies through middlemen. In APART, the CSCs will perform the role of middlemen and it will be like direct contact between farmer and rice processing companies that will reduce the procurement cost, logistic cost, intermediary cost and the supply chain cost.

At the time of harvest, there is less market price of paddy, but the poor farmer have to sell them at lower price for instant cash. CSCs will endeavor to work for the farmers to give them the minimum support price of the rice. Govt. appropriate authorities should work for a clear Govt. pricing policy of Rice.

CSCs will take the market intelligence Tips from the ARIASS marketing experts. Market researcher and appropriate extension machineries of the Agriculture Department.

Small rice processing units may be encouraged on entrepreneurship mode at local level with necessary bank linkage and CSCs will play vital role here.

Necessary market linkage capacities may be built up to the CSCs for sale of rice food at reasonable price in bulk or retail quantity to appropriate buyers inside or outside the State or Country through internet business avenues.

Price Mark-up in Rice

Sl.	Value Chain Actor	Buying Price (Rs/MT)	Selling Price (Rs./MT)	Gross Margin (Selling-Buying Price)	Costs incurred (Rs./MT)	Net Margin (Rs.)	Share in consumers' Rupee (%)
1	Rice farmer	Rs. 8560 (Cost of cultivation for producing 1 MT.)	Rs. 14100	5540	Farmers' level Harvesting-Rs.700 Threshing-300 Cleaning/Winnowing-300 Drying-200 Storage-100 Transportation Charge(on farm & off-farm)-300 Packaging/bagging-800 Market fee-10	2830	34%
2	Small Market Trader/Small Aggregator(buys from farmer through Commission Agent)	14100	15500	1400	Tranportation-400 Storage-200 Paid to Commission Agent-100 Market fee-10	690	8%
3	Whole sale Buyer (buys from small market trader through Commission Agent)	15500	17500	2000	Transportation-300 Storage-100 Loss in Shrinkage,Deterioration,Improper handling, Package failures' Supervising- 200 Mandi fee-10 Paid to Commission Agent-100	1290	16%
4	Processor (Milling only)	17500	20000	2500	(Drying, ,Milling for dehusking, Cleaning, sorting, Grading, Packaging, Storage) Labour charge-500 Transport-300 Misc.-200	1500	18%
5	Whole Seller	20000	22000	2000	Transit-300, Storage-100 Packaging &other price discovery-100	1400	17%

Sl.	Value Chain Actor	Buying Price (Rs/MT)	Selling Price (Rs./MT)	Gross Margin (Selling-Buying Price)	Costs incurred (Rs./MT)	Net Margin (Rs.)	Share in consumers' Rupee (%)
					Misc. Expenditure for sales-100		
6	Retail Seller	22000	23000	1000	Transportation-300 Storage-100, packaging & other price discovery-100 Misc. Expenditure for selling operation-50	550	7%
	Total				**6180**	**8260**	**100%**

Critical constraints in Rice:

1) Small and fragmented land holdings stand on the way of many advanced technology and marketing management.
2) Non availability of quality seeds and stress tolerant varieties.
3) Farmer investments in fertilizers, irrigation etc. is minimal due to risk factor of flood, drought and submergence. Farmers are poor and have minimum credit access to Banks and insurance cover.
4) Post harvest Management practices are poor causing loss in quantity and quality of produce,
5) Farmers lack in value chain activities of rice. At the time of harvest, there is less demand of rice, but farmers have to sell at low price for immediate cash needs.
6) There is lack of well organized marketing management chain.
7) There is lack of organic approach for access to foreign market.

Upgrading strategies

Sl	Critical constraints	Upgrading strategies
1	Farmers are poor and therefore have fragmented and small areas of land for paddy cultivation. As a result high technology adoption, marketing management etc. become difficult.	Farmers will be organized under common platform of FPO/CSC to use modern technology and better marketing management
2	Non – accessibility to quality seed and stress tolerant varieties. Most farmers routinely save their seed from one harvest to the next which results segregation loss of Hybrid and certified seeds.	Intervention to strengthen the seed systems (informal, semi-formal and formal) by enhancing the capacity of farmers, seed growers, seed dealers and distributors, seed companies/corporations, extension workers etc. in seed production, Processing and storage, ensuring the viability of quality foundation seeds for multiplication to seed growers, promoting seed entrepreneurships to increase the profitability of farmers and ensure a local supply of quality seed, multiplying seeds and evaluating new varieties in a participatory mode. Stress Tolerant Rice varieties (STRVs) including drought and submergence tolerance can be promoted.
3	Business of rainfed nature and because of high risks associated with monsoon season, farmers' investments in fertilizer and irrigation water are very minimal. Economic condition of poor farmer also stand on the way of fertilizer use, irrigation investment etc.	Once the risk factor is taken out, farmers will start investing more. De-risking by deploying high yielding stress tolerant rice varieties. Nutrient management practices, water efficient technologies will be evaluated and demonstrated. Credit access from banks, insurance of crops will encourage farmers for higher investment.
4	Post harvest Management practices are poor causing loss in quantity and quality of produce	Improved and modern Post harvest management practices will be adopted
5	Most of the farmers are not acquainted with the value chain activities and its usefulness. Moreover, due to immediate cash needs, the farmers are not able to fetch the advantage of value addition. Value addition by processed food in Rice Industry is almost non-existents	Efforts will be made to bring the farmers under Govt. procuring system to get minimum support price. A proper value addition chain of processed and non-processed rice food chain will be developed.
6	Lack of well organized marketing management chain	Marketing Management chain will be well developed
7	Proper organic approach with certification of export valued rice crops like scented Joha, Bao rice with red Kernel, Soft rice (instant rice or breakfast rice or Komol Chawl or chakua) has not yet developed	A proper organic approach will be undertaken for market access to foreign as well as domestic market while procuring the organic paddy, the rice buyers will closely examine the organic status and therefore a system will be developed to properly monitor and control the whole organic paddy cultivation process.

Action Plan for Rice:

1) Strengthening the seed systems and adoption of stress tolerant rice varieties.
2) Introducing and promoting scale appropriate mechanization.
3) Promotion of improved crop management practices including ICT-based decision tools precision agronomy.

4) Supporting and strengthening entrepreneurship to increase access to technologies and rural employment generation.
5) Developing science based rice monitoring system for yield prediction and better science based crop insurance policy.
6) Capacity building.
7) Promotion of better and improved post harvest management.
8) To encourage value adoption in processed food of Rice.
9) Market exploration through organic ally grown selected rice varieties and marketing of processed Rice food

Value Chain Development Plan (VCDP) for Maize

Introduction:
Maize (*Zea mays* L.) is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals.

In India, maize is the third most important food crop after rice and wheat. It is cultivated in 7.66 million ha with a production of 15.50 million MT (2015-16) mainly during rainy season which covers 85% area. Maize is now being popularized as a cool season crop particularly in areas where temperatures are not very low. Cool season maize has less attack of pests and weeds and management is easier. Maize in India, contributes nearly 9 % to the national food basket and more than 3030 Million USD to the agricultural GDP at current prices apart from generating employment of over 100 million man-days at the farm and downstream agricultural and industrial sectors. In addition to being a staple food for human beings and quality feed for animals, maize serves as a basic raw material as an ingredient to many industrial products which include starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceuticals, cosmetics, films, textiles, gum, package and paper industries etc.

In Assam, maize is grown in an area of 27,953 ha producing 93,179 MT. The average productivity is 3.33 MT/ha. The maize value chain is very short in Assam. Major consumers of maize grains are poultry and animal feed industries.

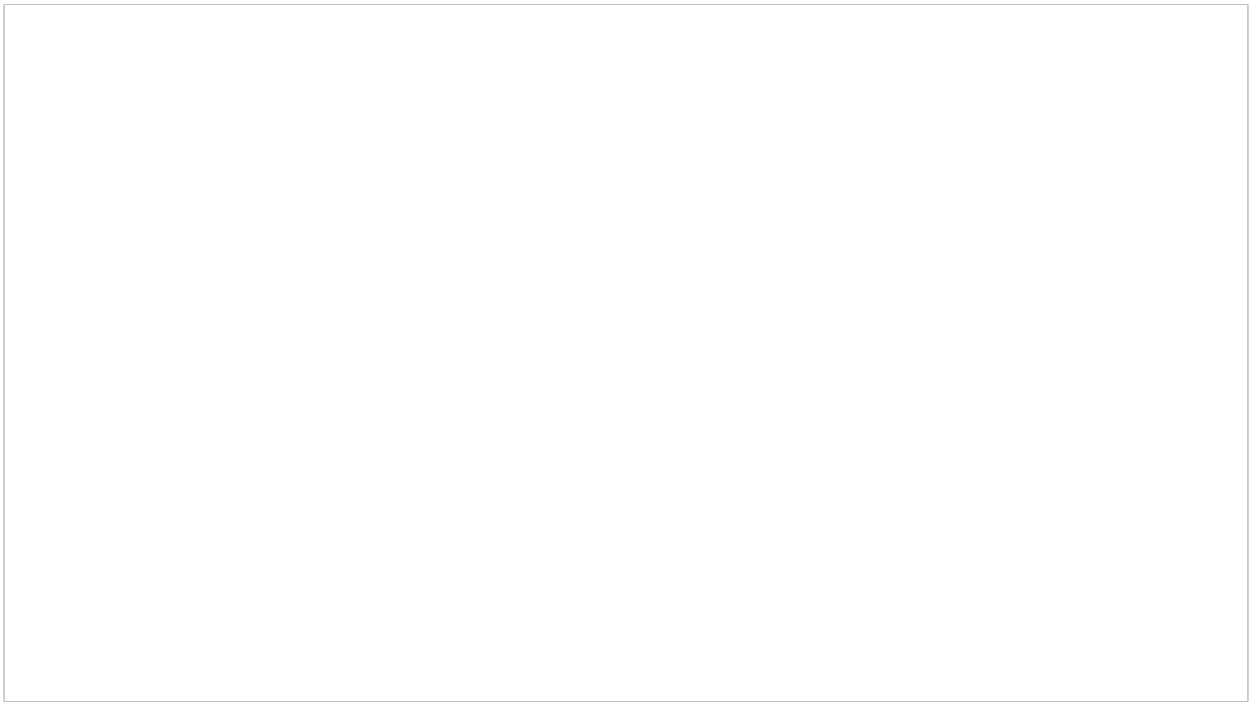
Table 1: District-wise Area, Production and Productivity of Maize in Assam (2014-15)

Sl.	District	Area (ha)	Production (MT)	Productivity (MT/ha)
1	Baksa	340	1183	3.48
2	Barpeta	70	221	3.16
3	Bongaigaon	894	2598	2.91
4	Cachar	102	236	2.31
5	Chirang	297	864	2.91
6	Darrang	5085	14207	2.79
7	Dhemaji	304	1367	4.50
8	Dhubri	1195	3209	2.69
9	Dibrugarh	98	249	2.54
10	Dima Hasao	3405	11843	3.48
11	Goalpara	245	582	2.38
12	Golaghat	237	654	2.76
13	Hailakandi	20	34	1.70
14	Jorhat	25	63	2.52
15	Kamrup (M)	66	167	2.53
16	Kamrup (R)	246	713	2.90
17	Karbi Anglong	10375	37969	3.66
18	Karimganj	35	74	2.11
19	Kokrajhar	935	2230	2.39
20	Lakhimpur	103	462	4.49
21	Morigaon	200	330	1.65
22	Nagaon	593	1826	3.08

Sl.	District	Area (ha)	Production (MT)	Productivity (MT/ha)
23	Nalbari	70	215	3.07
24	Sibsagar	32	105	3.28
25	Sonitpur	1420	7323	5.16
26	Tinsukia	966	2732	2.83
27	Udalguri	595	1723	2.90
	APART Distts total	19804	67303	Av=3.39
	Non APART Distts total	8149	25876	Av=3.17
	Total	**27953**	**93179**	**Av=3.33**

APART Districts

Non APART Districts



Maize Clusters:

Sl.	District	Block/Cluster	Villages	Area (ha)	Production (t)	Productivity (t/ha)
1	Barpeta	Gobordhana	Dumuni, Khairabari, Nmanipur, Katajharpathar (4)	50	157.80	3.16
		Bhawanipur	Borbala, Betbari, Betbari Pather, Duttakuchi, Jogerpam, Dhakaliapara, Kadamguri (7)	150	473.40	3.16
2	Darrang	Kalaigaon	Panbari, Dhansiri, Chamuaghat, Barjhar (4)	466.67	1303.87	2.79
		Paschim Mangaldoi	Bar Nagaon, Choto Nagaon, Boinaiojapara, Barthekerabari, Saruthekerabari, Garkhowapara, Bhalukhowapara, Bhangurichuba, Mointari, Barkumarpara, Chengilipara, Kuyapani, Dariapara, Niz Rangamati, Banglapara, Sadau Mara (16)	906.67	2533.23	2.79
		Sipajhar	Hatimuruia, Ruparikash, Satkhali, Chaladol, Rajapukhuri, Sanowatari, Dosotoni, Majarchuba, Kiarakara, Furuhatali, Upper Kuraua, Bhati Kurua, Dakhin Kurua, Pachim Kurua, Kacarijhar, Borchala, Hazarikapara, Satmodar, Pithakhowa, Debananda (20)	1146.67	3203.79	2.79
		Bechimari	Duliapara No.3, Golandi No. 2, Kunwaripukhan, Mollapara, Bagarbari, Baligaon, Chukabahi, No. 2 Mazgaon, Padupuri, Baruajhar No. 4, Barujhar, Jangalpara, Gorakhat, Borjhar Bazar, 2 No. Borjhar, Madho Gohain Gaon (15)	376.67	1052.41	2.79
		Dalgaon-Sialmari	Ondolajhar, Gaaidingi, Dhanshreekash No. 1, Gadhowa, Gadhowa Chapori, N.K. Garapari, Khataniapara, Hirapara, Majgaon, Karmipara, Chenialpara, Paniakhata, Badli Bariali, No. 3 Arimari, No. 4 Arimari, No. 5 Arimari (17)	960	2682.24	2.79
3	Dhubri	Birsing Jarua	Majerchar Chalakura, Chalakura-II & IV (3)	175	467.25	2.67
		Agomoni	Sagolia-I,Sagolia-II (2)	200	534	2.67
4	K. Anglong	Lumbajomg	Dillaji (1)	51.33	191.01	3.72
		Rongkhang	Purna Basti (1)	50.67	170.65	3.37
5	Morigaon	Mayong	Sandakhaiti, Rajamayong, Hatibanghi (3)	360	593.28	1.65
6	Nagaon	Dhalpukhri	Mandi,Thaisubali (2)	194	633.80	3.27
		Juria	Jengoni, Sutirpar, Meleka Dhing, Jamuguri, Auniati (6)	110.80	277.33	2.50
		Kathiatoli	Amdubi, Sildubi, Hatikhuli, Pakali, Garubandha (5)	147.47	369.11	2.50
		Khagarijan	Phulaguri, Shillangoni (2)	101.87	254.97	2.50
		Batadrava	Kandhulimari, Sologuri, Dumdumia (3)	281.07	703.51	2.50
7	Nalbari	Barkhetri	Kurikarmarichar, Bhangnamari, Nawbazarchar (3)	138	423.66	3.07
8	Sonitpur	Dhekiajuli	Lokhra , Sonai Miri, Dhekiajuli, Dalang Basti, Sonai Nepali, Parmaighuli, Nepam Baghchung, Punioni (10)	125.33	649.23	5.18
		Nagshankar	Samrhdoloni , Botianoka (2)	144	745.92	5.18
		Balipara	Lokhra, Sonai Miri, Dhekiajuli, Dalang Basti, Sonai Nepali, Parmaighuli, Nepam Baghchung, Punioni (8)	125.33	649.23	5.18
		Borsola	Rahmanpur, Nurpurjut Bhoiraguri Pathar, Chitalmari Borsimalu, Rani Tapu, Tintiak chapori, Muslim Chapori, Gaitapu (7)	720.67	3733.05	5.18
	Total	**Total 22 blocks**	**Total 141 villages**	**6982.22**	**21802.74**	**Av=3.12**

Maize Value Chain: Actors and Activities:

Activities	Input Supply	Production	Trading (in market)	Wholesale buying (mainly through CAs)	Processing
Actors	Input dealer	Farmer	Traders	Commission Agents and Traders	Processor
Support Services	Transport, Financial services	Extension, Transport, Credit	Transport, Credit, Storage	Transport, Credit, Storage	Storage, Transport
Location	Input market	Farm	Market	Storage, Transportation	Industrial cluster/estate/ consumption centre etc

Input Availability:

Seed: Number of farmers using hybrid seeds (sold by private companies) in the clusters is increasing. Some of the leading brands are Monsanto, Advanta and some from the Govt sector. Seed is the major cost (15-20%) in production cost just after labor. Good quality hybrid seed of private company costs around Rs. 180 per Kg. Major reason for majority market share of private seed companies is not only quality but also making the seed available at the right time. The entire seed sale happens on cash basis.

Agro Chemicals: Among the agrochemicals used, major ones are pesticides, fungicides and weedicides. *Pesticides:* Though maize is not affected by many diseases, but there is a incidence of borers, sucking pests, cut worms and soil pests. In general, borer is controlled by Phorate 10 G @ 10 kg/ha or Carbaryl 4% 20 kg/ha, aphids and mites are controlled by Profenophos. Termites are controlled by Furadon 3 G.

Fungicides: Major diseases are leaf blight and stalk rot. Leaf blight is controlled using combi-product Mancozeb+Carbendezim. Stalk rot is controlled by Thiophenate Methyl.

Weedicides: For specific chemical control of weeds in maize, Simazine and Atrazine are used.

There is no big market for sprayers and other tools and implements. These are often used on sharing basis and the bigger equipments are also rented out by few progressive farmers. Maize shellers are used for separation of grain from cob. These are used by farmers on rental basis. Around Rs. 500 is charged for shelling of one tone maize grain.

Fertilizers: Under dosing of Phosphatic and Potassic fertilizers is prevalent among the cluster farmers. Farmers are using Urea in right dose while use of Phosphate and Potassic fertilizers is minimal. Fertilizers are available from agri input dealer or cooperative depots. Zinc deficiency is widespread.

Bio-fertilizers and bio-control agents are not used by maize farmers, nor there any application of micro-nutrients.

Adoption of Package of Practices:

Comparison of recommended package of practices for rabi maize and that followed by maize farmers in the APART clusters

S. No.	Practices	Recommended	Actual Practice by Farmers
1	Varieties	Hybrid: Ganga 101, Ganga-5, Deccan Hybrid Composites: Kishan, Vijay, Pratap, Diara, Hinius	DKC 9081, 9135, 9120, 900 M Gold and Hishell, Allrounder (Monsanto), RIL 9999 (Tata Rallis)
2	Land Selection	Well drained, sandy loams, no water logging	Sandy loam to clay loam
3	Field Preparation	Thorough ploughing to obtain deep fine tilth	Land preparation by Power tiller (60%) and Tractor (40%)
4	Time of sowing	Sep-Oct, may be delayed upto mid November	Oct-Nov
5	Seed Treatment	Captan 3g/Kg or Carboxyn 3 g/Kg or Carbendezim 2g/Kg	Already treated seed available (in case of private sector hybrids)
6	Seed Rate	22.5 Kg/ha	Hybrids= 22.5 Kg/ha Local Varieties=30 Kg/ha
7	Spacing	60cm*25 cm	60cm*25 cm
8	Method of sowing	Dibbling	Dibbling (by hand)
9	Fertilizers	Urea=135-180 Kg/ha SSP= 248 Kg/ha MOP= 60 Kg/ha	Urea=150 Kg/ha SSP=Nil MOP=Nil
10	FYM	4.5 MT/ha	5 MT/ha
11	Inter-culture	Light hoeing as and when necessary	Use Weeder at 25 DAS
12	Weeding	Simazine/Atrazine 100-150 G a.i./ha	Atrazine (recommended by input dealer)
	Insect Pests		

S. No.	Practices	Recommended	Actual Practice by Farmers
14	Stem borer	Phosphomidon 100 EC Fenitrothion 50EC	Phorate 10 G
15	Termites		Furadon 3G
16	Cut worm	Malathion 5%	Dimethoate 2ml/l
17	Aphids, Cob borer, Jassids and Mites	Methyldemeton 25EC or Phosphomidon 100EC or	Dimethoate 2ml/l
	Diseases		
19	Maydis Leaf Blight	Mancozeb or Zineb@300-500 G/bigha	Carbendezim+Mancozeb
20	Turcicum Leaf Blight	0.25%-0.3% Mancozeb/Zineb	Nil
21	Seed Rot & Seedling Blight	Certified seeds from reliable source	Certified seeds are used
22	Pythium Stalk Rot	Captan or Thiram @ 400 G in 16 liters of water	Thiphenate Methyl
23	Charcoal Rot	Sow resistant cultivars like Diara and Hinius	No occurrence of the disease
24	Banded Sclerotial Disease	Carbendezim @ 0.05%	Carbendezim @ 0.05%
25	Irrigation	Grand Growth (45-50 DAS) Tasseling (70-75 DAS) Grain Setting (110-115 DAS)	Veg Growth (25 DAS) Grand Growth (55 DAS) Flowering (100 DAS)
26	Harvesting	When husk cover turns yellow	When husk covers turns yellow. By plucking the cob from the standing plant. The remaining plant acts as a fodder for the animals
27	Shelling	No recommendation	Using shellers on rent
28	Yield (Grains)	Not specified	3-3.25 t/ha

Cost of cultivation per hectare of maize in APART clusters

Cost/Recn .items	Units	Quantity	Rate	Total in INR
LABOUR				
Land preparation	Manday	8	220.00	1760.00
Sowing	DO	2	220.00	440.00
Manure & PP application	DO	10	220.00	2200.00
Harvesting	DO	20	220.00	4400.00
Post harvest	DO	25	220.00	5500.00
Ploughing by Tractor	per ha	1	2500.00	2500.00
Total Labour		**65**		**16800.00**
Inputs				
Seed	Kgs	22.5	180.00	4050.00
Manure (FYM)	per cart	1	2500.00	2500.00
Urea	Kg	150	6.00	900.00
Pesticide	LS			700.00
Irrigation	LS			300.00
Total Inputs				**8450.00**
TOTAL COSTS(INR)				**25250.00**
Production	**3.12 MT**			
Sale Price	**Rs. 13000/MT**			
Income from Production (INR)		**3.12**	**13000.00**	**40560.00**
Net Profit(INR)				**15310.00**

Market:

There is no sale at farm gate, farmers have to take the produce to the market for sale. Most of the maize produced, is sold in weekly markets where facilities and other infrastructure is very poor. Transportation to market is done through horse cart or mini truck depending upon the quantity available. In the market auction doesn't happen rather one to one transactions take place. Farmers get around Rs. 13000 per MT for good quality maize. The first and foremost deciding parameter is moisture content of the grains. It is tested by cracking a grain using teeth. The sound and ease of crack indicates the moisture content of the grain. Ideally, it should be less than 12% when brought in the market. For high moisture content, the price will come down to Rs. 9000-10000 per MT. In the market there are no particular preferences for certain varieties/hybrids of maize. Lots are mixed by traders and sold as mixture.

Highest price offered in the market is during Oct-Nov at Rs. 13,000 per MT while the lowest price offered in the market is during June-July which sometimes comes as low as Rs. 9000-10000 Per MT. Apart from selling in the market, farmers also sell directly to wholesale buyers. In this case, farmers first take a sample to the wholesale buyer, if accepted, the price is determined based on moisture content (and incidence of fungal infestation, if any, which is due to high moisture content). If agreed, the farmer brings the entire lot.

Almost entire quantity goes out of the production clusters to processing plants of Assam and also outside Assam. These are Amrit Feeds (Rangia), Nexus (Guwahati), Suguna (Jagiroad), Sona (Chhaygaon), Chinamara (Jorhat). Market Price of maize grain is around Rs. 13000/ MT. Outside Assam; it goes to Siligudi (Suguna), Anmol (Kolkata), Tripura, Nagaland (in spirit industry). There are few crushing plants in Darrang which crush the maize and supply as raw animal feed during times of flood mainly in State Govt distribution schemes.

Price mark up in maize:

Sl.	Value Chain Actor	Buying price (Rs./MT)	Selling Price (Rs./MT)	Gross Margin (Selling – buying price)	Costs incurred (Rs./MT)	Net Margin (Rs.)	Share in Consumer's Rupee (%)
1	Maize Farmer	8093 (cost of cultivation)	13000	4907	Costs incurred by farmer Shelling=500 Market fee=10 Transport charge=300 Paid to Commission Agent=100 **Total= Rs.910**	3997	46
2	Market trader (buys from farmer through Commission Agent)	13000	14000	1000	Costs incurred by trader *(market buyer) Loading=200 Market fee=10 Paid to Commission Agent=100 **Total =Rs.310**	690	8
3	Wholesale buyer (buys from market trader through Commission Agent)	14000	15700	1700	Unloading =100 Transport= 300 Mandi fee= 10 Sortage= 5 Packing= 750 Paid to Commission Agent=100 **Total=1265**	435	5
4	Processor (crushing only)	15700	21000	5300	Labour=120(drying) Transport=300 Crushing=30 Moisture losses=880 Jute bags=300 Loading/unloading/packing (in jute bag) etc=100 **Total=1730**	3570	41
	Total	----------	----------	**12907**	**4215**	**8692**	**100**

Market Intelligence:

Input side: The source of information and market intelligence for input dealers is the company executives who are in the field particularly those in the sales and marketing function. They also get information on package of practices by the company officials particularly when they attend field days, field visits and dealer visits on the standing crop but this information is confined mainly to the use (proper method and dosage) of that particular company's products. They also get a lot of information on performance of new molecules/products coming into the market through their business network and other dealers and distributors of agricultural inputs. As a single dealer sells the products of 8-10 companies, he will have information on the products of all these companies. When dealer/distributor meets are organized by the company before (to give them sales targets and explain incentive schemes) and after (to recognize the target achievers) the sales season, there is lot of information exchange as apart from that particular company, each one is handling many different companies. In a nutshell, they are very good source of information but from a farmer's perspective this information is confined to the method of usage and dosage of the products of the companies handled by them. It essentially means that any information which does not have a business/profit angle will not be included in such communications.

Farmer: The source of information to the farmer is fellow farmers, progressive farmers, agri input dealers and Government Agriculture Department functionaries like ATMA officials and Village Level Extension Workers. Private agri input company officials organize demonstrations on farmers' fields and field days, harvest days etc but the focus is on the products of that particular company. In this case, the farmer gets only the business oriented information. However, the farmer still does not get the timely information on prevailing market prices which is utmost important to get good realizations. Customized (District and block level) timely information to cluster farmers on weather forecast is still a distant reality.

Output side: Market traders get the information in the market itself plus the business network mainly through mobile phones. Wholesale buyers also get the information from their business network**.** Many wholesale buyers are suppliers to organized processors like Animal feed units and spirit industry. They get good amount of information from their customer network particularly on the industry trends, possible forecasts, trade routes and bulk movements of the commodity. In fact, few wholesale buyers are systematically integrated into the manufacturer processes through SAP Id, client profiles, vendor accounts etc.

Processor: Big processors have field staff and sourcing/purchasing team who not only gather market information but analyze it to forecast future trends. Many of them supply to Govt. in various schemes.

Critical Constraints:

The following critical constraints were identified w.r.t. maize value chain in APART clusters:

1. Improper land preparation
2. Lack of line sowing
3. Absence of ridge sowing in high rainfall areas
4. Low penetration of hybrid seeds
5. High incidence of weeds
6. Deficiency of zinc and phosphorous
7. Attack of borer
8. Unavailability of shellers
9. Improper drying
10. No fumigation during storage

Upgrading Strategies w.r.t. to critical constraints identified

S. No.	Challenge/Issue	Strategy
1	Improper land preparation	Updating Package of Practices (PoP) Demonstrations and training to the farmers Mechanization
2	Lack of line sowing	
3	Absence of line sowing in high rainfall areas	
4	Low penetration of hybrid seeds	
5	High incidence of weeds	
6	Deficiency of zinc and phosphorous	
7	Attack of cob borer	

S. No.	Challenge/Issue	Strategy
8	Maize shellers unavailability	Renting out of sheller from CSC on group basis, purchased with part contribution from cluster farmers.
9	Improper drying	Dryers at CSC
10	No fumigation during storage	Training of warehouse managers and farmers

Action Plan:

Updating Package of Practices: AAU will update Package of Practices (PoP) for cultivation of maize. The updated PoP will be disseminated to farmers through pamphlets laying emphasis on adoption of high payoff interventions.

Organizing On-Farm Demonstrations and Famer Trainings: Appropriate number of on-farm demonstrations and related farmer trainings will be organized for dissemination of improved seeds and production practices for cultivation of maize to the farmers. Farmers will be provided seed drill through CSCs for promoting line sowing of the crop.

Common Service Centers (CSCs) will be used for drying, cleaning, grading, aggregating and packaging of produce. Dryers will be made available in maize CSCs. On the input side, apart from agrochemicals, maize shellers will be made available to farmers on group basis on rent.

Storage: Warehouse managers of warehouses of Assam State Warehousing Corporation (ASWC) will be trained on proper fumigation during storage. In order to minimize price risks, the facility of warehouse receipts will be also available to farmers. Farmer Producer Companies and CSC operated by them will also help member farmers in accessing input markets for seeds, fertilizers and other inputs, and storage of produce in ASWC godowns for accessing warehouse receipts.

Value Chain Development Plan (VCDP) for Mustard

Introduction:

Among the oilseed crops, mustard occupies a prominent position in Indian oilseeds scenario. India is the largest rapeseed and mustard growing country in the world occupying the first position in area and second position in production. Rapeseed and mustard have caught the fascination of farmers in Assam. In areas where the early maturity rice varieties are being grown, rapeseed becomes a popular succeeding crop. However, the productivity of the crop is low and it varies from year to year. Mustard is grown entirely as a rainfed crop because of non–availability of irrigation facilities. Mustard is Rabi season crop. Its sowing time is November- December and harvested during February-March.

Assam has a sizeable area (0.28 million ha) under mustard cultivation but the productivity level is very low (0.667 t/ha). The reasons for low productivity are poor knowledge about newly released varieties, crop production and protection technologies and management practices in the farmer's field. Total mustard production in Assam is around 0.19 million tonnes.

Mustard is a drought tolerant crop. However, mustard does not tolerate extended periods of drought and should not be grown in dry sand and dry sandy loam soils. The oil content in mustard sp. varies between 36 and 42 %; of this, average oil recovery is approximately 33-35%. Once the oil is extracted, the remaining part of the seed is used to produce oil cake, an important source of animal feed.

District wise area, production and productivity of mustard in Assam (2014-15)

Sl.	District	Area (ha)	Production (t)	Productivity (t/ha)
1	Baksa	10380	5384	0.519
2	Barpeta	18263	9865	0.540
3	Bongaigaon	7050	4002	0.568
4	Cachar	1725	1133	0.657
5	Chirang	11555	5606	0.485
6	Darrang	15205	9017	0.593
7	Dhemaji	16930	17650	1.043
8	Dhubri	15305	12924	0.844
9	Dibrugarh	2750	1925	0.700
10	Dima Hasao	3074	941	0.306

Sl.	District	Area (ha)	Production (t)	Productivity (t/ha)
11	Goalpara	7791	3428	0.440
12	Golaghat	8729	4503	0.516
13	Hailakandi	375	140	0.373
14	Jorhat	10365	8129	0.784
15	Kamrup (M)	1651	1037	0.628
16	Kamrup (R)	10740	6404	0.596
17	Karbi Anglong	19713	11316	0.574
18	Karimganj	188	130	0.691
19	Kokrajhar	25991	18025	0.694
20	Lakhimpur	25020	19582	0.783
21	Morigaon	8250	4447	0.539
22	Nagaon	14882	10177	0.684
23	Nalbari	8655	6985	0.807
24	Sibsagar	1998	1126	0.564
25	Sonitpur	20152	12307	0.611
26	Tinsukia	7233	5487	0.759
27	Udalguri	7036	5852	0.832
	APART total	**214435**	**140405**	Av=0.655
	Non APART Total	**66571**	**47117**	Av=0.707
	Total	**281006**	**187522**	Av=0.667

APART Districts **Non APART Districts**

APART Mustard Clusters:

Sl.	District	Block/ cluster	Villages	Area (ha)	Production (t)	Producti-vity (t/ha)
1	Darrang	Paschim Mongoldoi	Bathekerabari, Saruthekerabari, Garkhowapara, Bhalukhowapara, Bhangurichuba, Dariapara, Niz Rangamati, Banlapara, Sadau Mara, Monitari, Barkumapara, Chengilipara, Kuyapani (13)	306.67	181.85	0.593
		Sipajhar	Dakhin Kuural 1 & 2, Bhati Kutura, Packim Kuraua, N.C. Kurua, Hatimuria, Ruparikash, Dasotani, Chaladoi, Rajapukhuri, Sanowa, Sanowatari, Majorchuba, Sathkhali, Debananda, Niz Siphajhar, Hazarikapara, Jhakurapara, Borchuba, Pithakhowapar, Borchuba, Setmbar, Kachajijhar, Buradol, Jatatipur, Burha Haldia, Titikuchio, Bishnupu (28)	793.33	470.45	0.593
		Bechimari	Kakabhangi, Batabari No. 5, Barujahar, Jamalpur, Baligaon, Nagaon, Namati, Chukhahati, Alisinga Jangal, Dalgaon Khuti, Dwarpar, Kahibari, Sarisabari, Bechimari, Baruajhar, Dongpara, No. 3 Baruajhar, No. 4 Baruajhar, Daipam, Simaluguri, Chakarbasti, Khairakata, Takimari, No. 3 Madhoggohaing, No. 2 Chikanmati, No. 2 Borgorakhuti, Baruapara, Borgaga, Bagisa, Gaon, Borgora, Tea, Chikanmati Tea, Dalgaon Town, Chakargaon, Gorkhakhat No. 1, Borgorakhuti, Niz Dalgaon, No. 1 Borjhar, No. 2 Borjhar, Borjhar Grant No. 1, Darrang Bahajhar, No. 3 Darrang Barajhar, Madhupur, Nadirkash, Bechimari, Jangal, Gendapukhuri, No. 1 Chikanmati Borghuri (49)	414.67	245.90	0.593
2	Dhubri	Agomoni	Hazirhat (1)	150	122.55	0.817
		Chapar Salkocha	Simlabari Lalkura, Nunmati, Direrchar, Falimari, Foudarchar, Shildanga (6)	460	415.38	0.903
		Gauripur	Tisterpar, Dubirpar, K/Hasdaha-I, Madhusoulmari_I, Khudimari-I & II (6)	250	205.05	0.820
		Mahamaya	Kajaikata- I,II, III &IV, Dalaneralga- I & II, Kotpara Jhaupara, Boalkammri, Patkata-I & II, Johurmara (11)	300	270.90	0.903
		Rupshi	West Gaikhowa-II, Sukhatikhata, Chapgarh -I & II, Tiamari-I, Rowa-I & III, Tiamari-II (8)	193	158.24	0.820
3	Golaghat	Padumoni (East Golaghat Dev. Block)	Kathkatia, Noragaon (2)	93.33	41.44	0.444
		Bokakhat (Golaghat West Dev	Tamulipathar, Diffolopothar, Panbari, Bamunpothar, Bamungaon, Bongali Gaon, Japoripothar, Kandulimari, Dhobaati Beloguri,	1151.20	663.34	0.576

Sl.	District	Block/ cluster	Villages	Area (ha)	Production (t)	Producti-vity (t/ha)
		Block)	Kolakhowa, Kalioni Block, Bohikhowa, Dhudang, Aphola, Kemeri, Bhulukaguri, Lohorasapori, Bortika, Porongonia, Budhhbari, Borpak, Bongkuwal (22)			
		Kokodonga	Butolikhowa, Thengalgaon, Lemchapori (3)	197.33	87.62	0.444
4	Jorhat	Ujani Majuli Dev Block	Ujoni Gezera & Kathani, Keng Mili & Chowerkia, Sonowal Chapori & Haldhibari, Lachan Chapori, Mowamari, Kopatholi, & Kandhulimari, Tengapania, & Chaporigaon, Sukansuti, Hayengia, Chatailur, & Dhonai Chapori, Major Deori & Petuajan Deori, Mudoibil & Chiram Deori, Chiram Teli Abani, Milonpur, Baligaon & Mohabheti,Ujoni Cherepai & Namoni Cherepai, Kumarbari & Maghuwachuk, Jamudchuk, Damukbial, Bor Kolia, Birina Kolia, Namoni Kolia, & Lahon (22)	1200	948.40	0.790
		Koliapani	Jelengi, Mukaloni, Burasuwa Pather, Bormathuri, Sangunpara, Azarguri & Chinatoil, Bhakat Gaon, Kumar gaon (8)	306.13	243.07	0.794
		Majuli Dev Block	Borgoya, Birinabari, Chalak, Koliapani, Mohorichuk, Jakoibowa, Balichapori, Goal Gaon, Elengi (9)	880	698.72	0.794
5	Morigaon	Mayong	Rajamayong (1)	1240	668.36	0.539
6	Sivsagar	Demow	Netaipukhuri (1)	200	116	0.580
		Gaurisagar	Mokaloni, No.1 Chintamonigarh, Rupohimukh, Soraguri Chapori (5)	200	116	0.580
7	Sonitpur	Dhekiajuli	Mainaoshree, Maoriapur, Jordanpur, Champa Pathar, Tharejuli, Jiaguri, Sapaishree, Swargapmi, Pachnoi, Laobari, Labanupam, Nagapathar, Nabill, Palxariguri, Ghurmari, Pabhamari (16)	930.13	643.19	0.692
		Gabharu	Gereki, Bhomoraguri, Bhojkhowa, Jorgarh, Koroyani Nepali, Dolarbari, Rajbjhara, 3 No. Sirowani, Kacharipam (9)	738.67	510.79	0.691
		Pub Choiduwar	Dathkala, Toltoli ,Bordoloni, Gopaljahorni (4)	280	193.62	0.692
		Balipara	Amolapam, Bokajan, Parmaighuli, Punioni, Baghchung, Niz Haleswar, Sonai Miri, Sonai Pam, Sonai Nepali, Dharikati, Chatai (11)	664	459.16	0.692
		Bihaguri	Kasomari, Bhalukekhowa, Karmchuburi, Bordubia, Jengar Chubri, Jaroni Tinkhoria, Niz Bihaguri, Bihaguri, Sagolichuburi, Rangamati, Sagolihat, Mekonorchuburi, Kalitagoan, Singachubri, Bapubhati, Baruahdoloni, Buwalguri, Puthimari, Gerua, Pithakhowa, Nam Pithakhowa, Jakaruwa Chuburi, Likhakgaon, Tumuki, Siporia Chuburi, Bharanguri, Garuduba, Nabil Kachari, Johanmarai, Hogaigoan, Botola, Dehkeri (32)	1121.73	775.68	0.692
	Total	**22 blocks**	**267 villages**	**12070.19**	**8235.71**	**0.682**

Mustard Value Chain-Actors and Activities:

Actors	Input dealer	Producer	Small Aggregator	Aggregator	Processor	Wholesaler (M. Oil)	Retailer	Consumer
Activities	Input supply	Production	Aggregation	Aggregation	Processing	Wholesaling	Retailing	Consumption
Support Services	Transport, Financial services	Extension, Transport, Credit	Transport, Credit, Storage	Transport, Credit, Storage	Storage, Transport, Processing	Transport, Storage	Transport, Credit	--

Input Availability- The key observations about input availability for mustard are:

- Role of seed suppliers in mustard value chain is very minimal as most of the famers use their own seeds (self saved seeds) which are often of non descripting nature. Seed Replacement Ratio (SRR) is very low.
- Retailing: Input supplier is often compelled to buy his inputs (fertilizers) at a higher price from the distributors. In the process the high price is transferred to the farmers/producers.
- Limited on farm training and a few demonstrations and advisory service are implemented by corporate brands along with the input suppliers.
- The major known varieties covering significant area are M-27, TS-67, TS-29, Pusa Mahek and TS-38, 45 S 46 (a hybrid from Pioneer)

Major reason for majority market share of private seed companies is not only quality but also making the seed available at the right time. The entire seed sale happens on cash basis.

Agro Chemicals: Very few pesticides are used. Though mustard is not affected by many diseases, there can be incidence of sucking pests. In general, aphids are controlled by Dimethoate.

Fertilizers:. Under dosing of Phosphatic and Potassic fertilizers is prevalent among the cluster farmers. Fertilizers are available from agri input dealer or cooperative depots.

Adoption of Package of Practices (PoPs):

Package of Practices being followed by mustard cluster farmers vis –a –vis recommended practices

S. No.	Practice	Recommended	Farmer Practice
1	Varieties	TM-2, TM-4, Varuna, TS-38, M-27, TS-29, TS-36, TS-46, Jeuti, PM-26, PM-27	M-27, TS-67, TS-29, Pusa Mahek and TS-38, 45 S 46
2	Soil	Sandy & other light soils	Sandy loam and riverine soils
3	Land preparation	Ploughing 4-6 times and laddering to fine tilth	2-3 ploughings and leveling
4	**Fertilizers (Kg/ha)**		
	Urea	Irrigated Rainfed 130 87	82.5
	SSP	250 220	113
	MOP	66 25	30
5	Seed rate(kg/ha)	10	11.25
6	Seed treatment	metalaxyl 35 WS @ 6 g/kg	Not done
7	Sowing time	Mid Oct to Mid Nov	Mid Oct to Mid Nov
8	Irrigation	At 50% flowering (6cm depth)	25 DAS
9	Inter-culture	15-20 DAS	Generally not done
10	**Insect pests**		
	Aphids	Dimethoate 30 EC@ 0.5 l/ha	Dimethoate
	Saw fly	Deltamethrin 2.8 EC @ 0.4 l/ha	Oxydemeton methyl 25EC
11	**Diseases**		
	Alternaria blight	Mancozeb 0.2%	Mancozeb 0.2%
	Wet rot or white blight	Carbendazim 0.05%	Carbendazim 0.05%
	Powdery mildew & downy mildew	No recommendation	Sulphur and copper based products
12	Harvesting	When 75-80% siliquae(pod) turn yellow	When pods start drying

Cost of Cultivation and Marketing:

Per hectare cost of cultivation of mustard in APART clusters

Cost/Revn items	Units	Quantity	Rate	Total in INR
LABOUR				
Land preparation	Man day	6	220.00	1320.00
Sowing	DO	1	220.00	220.00
Manure application	DO	2	220.00	440.00
PP application	DO	1	220.00	220.00
Harvesting -	DO	17	220.00	3740.00
Post harvest -	DO	20	220.00	4400.00
Ploughing by Tractor	per ha	1	2500.00	2500.00
Total of Labour		**47**		**12840.00**
Inputs				
Seed	Kgs	11.25	55.00	618.75
Manure	mt	5	50.00	250.00
Urea	Kg	82.5	6.00	495.00
DAP	kg	113	23.00	2599.00
Muriate of Potash	kg	30	12.00	360.00
Micro Nutrient(Borax)	kg	10	80.00	800.00
Pesticide	LS			750.00
Total Inputs				**5872.75**
TOTAL COSTS(INR)				**18712.75**
Production	**0.68 MT**			
Sale Price	**Rs. 35000/MT**			
Income from Production (INR)		**0.68**	**35000.00**	**23800.00**
Net Profit(INR)				**5087.25**

Price mark up in mustard value chain:

Sl.	Value Chain Actor	Buying price (Rs./MT)	Selling Price (Rs./MT)	Gross Margin (Selling – buying price)	Costs incurred (Rs./MT)	Net Margin (Rs.)	Share in Consumer's Rupee (%)
1	Farmer (Producer)	27520 (cost of cultivation)	35000	7480	Costs incurred by farmer Transport charge=300 **Total= Rs.300**	7180	40
2	Small Aggregator	35000	36000	1000	Costs incurred by trader Loading=200 Transport charge=300 **Total =Rs.500**	500	3
3	Aggregator	36000	38000	2000	Unloading =100 Transport= 300 Storage= 10 Bagging= 500 **Total=910**	1090	6
4	Processor (oil extraction)	38000	31500* (from M.oil) (@ Rs. 90/Litre) and 9750** (from Mustard oil Cake)(@ Rs. 15/Kg.) **Total=41250** (5000+9750)	3250	Transport=300 Oil Extraction=150 Unloading=100 Packaging=100 **Total=650**	2600	14
5	Wholesaler (M.oil only)	31500 (Purchase only M. oil)	35000*** (@100/litre)	3500	Loading=100 Unloading=100 Storage=10 **Total=210**	3290	18
6	Retailer (sale only M. oil)	35000	38500**** (@ Rs. 110//litre)	3500	Storage=10 **Total=10**	3490	19
	Total	----------	----------	**20730**	**2580**	**18150**	**100**

*(From **1 MT Mustard seed**, approximately **350 litre M. oil** can be obtained and processor's selling price of M. oil. Is **Rs.90/litre**

** (From **1 MT Mustard seed, 650 Kg Mustard oil cake** can be obtained and the price of oil cake is **Rs. 15 / kg**)

*** (Wholesaler sales M. oil to retailer @ Rs. 100/litre).

**** (Selling price of M**. Oil by retailer to consumer is Rs. 110/-litre.)**

Critical Constraints:

The following critical constraints have been identified in mustard value chain in APART clusters:

1. Cultivation of local/non descript varieties & no use of high yielding varieties and hybrids
2. Poor land preparation
3. Low plant population
4. No proper weed control
5. Harvesting at improper stage leading to grain shattering and other losses
6. Presence of foreign material in the produce and high moisture content
7. Low recovery of oil on account of obsolete techniques/technology (about 2% losses)
8. Weak links between processers and farmers

Upgrading Strategies:

Sl.	Critical Constraint	Upgrading Strategy(ies)
1	Cultivation of local/non descript varieties & no use of high yielding varieties and hybrids	Seed production capacity of AAU will be augmented for high yielding varieties and distribution channels will be strengthened Popularization of high yielding varieties from private sector Association with NRC mustard at Bharatpur
2	Poor land preparation	Farmers training and demonstrations on improved package of practices
3	Low plant population and improper spacing	
4	No proper weed control	
5	Harvesting at improper stage leading to grain shattering	

Sl.	Critical Constraint	Upgrading Strategy(ies)
	and other losses	
6	Presence of foreign material in the produce and high moisture content	Primary processing at CSC level. Small scale oil extraction facilities can be provided at CSC where volumes of seed are high
7	Low recovery of oil on account of obsolete techniques/technology (upto 2% losses)	Introduction of new technologies in mustard processing clusters
8	Weak links between processers and farmers	FPOs and CSC along with professional handholding

Action Plan:

Seed production capacity of AAU will be augmented by bringing more area under seed production of high yielding varieties. More seed production programs will be taken up with progressive farmers. At the same time production of breeder seed and foundation seed will also be accelerated. Capacities of Assam Seed Corporation (ASC) may be strengthened in order to ensure faster procurement and distribution of seeds. The private sector has developed high yielding varieties which need to be popularized.

Popularization of high yield varieties from leading private players: High yielding varieties and hybrid varieties are to be popularized.

Updating Package of Practices: AAU will update the Package of Practices (PoP) for cultivation of mustard. The updated PoP will be disseminated to farmers through pamphlets laying emphasis on adoption of high payoff interventions like proper field preparation, use of HYVs, weed control, application of Sulphur and control of sucking pests.

Organizing On-Farm Demonstrations and Famer Trainings: Appropriate number of on-farm demonstrations and related farmer trainings will be organized for dissemination of improved seeds and production practices for cultivation of mustard.

Common Service Centers (CSCs) will be used for drying, cleaning, grading, aggregating and packaging of produce. This will ensure a better price to the farmers. At the same time CSCs will also be used for sourcing, storing and distribution of agricultural inputs.

As most of the oil expellers are outdated, **modern technology of mustard oil extraction will be introduced into mustard processing clusters**. Cluster members will be encouraged to take up new technologies by showing them the benefits of improved technology. Efforts will also be made to introduce oil extraction in some of the CSCs and directly supplying to retailers and consumers etc under own brand name (in the longer run). This will be on a pilot basis and for smaller capacity.

Value Chain Development Plan (VCDP) for Pulses

(This value chain has been prepared for black gram. However, this will be broadly applicable to green gram, lentil, peas also)

Introduction:

In Assam, the Agriculture sector alone supports more than 75% population of the state and provides employment to more than 53% percent of the total workforce. Black gram popularly known as “Urad” is extensively grown pulse crop in Assam in a total area of around 52830 hectares, producing around 34237 tones with a productivity of around 637 Kg/ha. It is resistant to adverse climatic conditions and improves soil fertility by fixing atmospheric nitrogen in the soil. It is an important protein source and can help flight protein energy malnutrition widespread in developing countries.

District-wise Area, Production and Productivity of Black Gram in Assam

Sl.	District	Area (ha)	Production (MT)	Yield (MT/ha)
1	Dhubri	6592	5247	0.796
2	Sonitpur	5032	4056	0.806
3	Barpeta	5412	3969	0.733
4	Lakhimpur	2910	2213	0.760
5	Udalguri	1932	1844	0.954
6	Jorhat	5005	1739	0.347
7	Nagaon	2904	1646	0.567
8	Kokrajhar	2301	1601	0.696
9	Tinsukia	2033	1318	0.648
10	Bongaigaon	2090	1252	0.599
11	Goalpara	3083	1239	0.402
12	Baksa	1828	1151	0.630
14	Darrang	2119	1127	0.532

15	Karbi Anglong	1221	792	0.649
16	Dhemaji	1102	714	0.648
17	Golaghat	1159	695	0.600
18	Cachar	917	595	0.649
19	Kamrup (R)	968	478	0.494
20	Morigaon	670	423	0.631
21	Hailakandi	600	389	0.648
22	Nalbari	517	346	0.669
23	Dibrugarh	521	338	0.649
24	Chirang	771	326	0.423
25	Sibsagar	458	296	0.646
26	Dima Hasao	397	257	0.647
27	Kamrup (M)	229	148	0.646
28	Karimganj	59	38	0.644
	APART Distts Total	**41497**	**26610**	0.641
	Non APART Distts	**11333**	**7627**	0.673
	Total	**52830**	**34237**	**0.648**

APART Districts Non APART Districts

Black Gram clusters of APART:

Black gram clusters, villages, area and production

Sl.	District	Clusters/ Block	Villages	Area (ha)	Production (t)	Productivity(t/ha)
1	Darrang	Paschim Mangaldoi	Bathekerabari, Saruthekerabari, Garkhowapara, Bhalukhowapara, Bhangurichuba, Dariapara, Niz Rangamati, Banlapara, Sadau Mara, Monitari, Barkumapara, Chengilipara, Kuyapani(13)	306.67	163.15	0.532
		Pub Mangaldoi	Bandia, Baghpari, Mowarmari, Chereng, Gerimari, 2 No. Algachar, Puthimari, Koyaman, No. 3 Nanglichar, Piyajar Char, Kajia Char, North Gossaibari, South Gossaibar (14)	229.33	122.01	0.532
		Sipajhar	Dakhin Kuural 1 & 2, Bhati Kutura, Packim Kuraua, N.C. Kurua, Hatimuria, Ruparikash, Dasotani, Chaladoi, Rajapukhuri, Sanowa, Sanowatari, Majorchuba, Sathkhali, Debananda, Niz Siphajhar, Hazarikapara, Jhakurapara, Borchuba, Pithakhowapar, Borchuba, Setmbar, Kachajijhar, Buradol, Jatatipur, Burha Haldia, Titikuchio, Bishnupu (28)	673.33	358.21	0.532
2	Dhubri	Gauripur	Bhogdahar, Patamari (2)	200	173.40	0.867
		Nayergala	Bahir Chhapota, Nayeralga-II,III, Mayarchar-I,II,VI,VII, Kazarikata-V,VI, Jhelturchar (10)	1615	1400.2	0.866
		South Salmora	Baladoba,Tumni Laokhowa, Saldubi, Niz Monirchar, Baidergaon, Baushkati-IV, Ravatari-I, Seboltari (8)	400	299.20	0.748
3	Golaghat	Bokakhat (Golaghat West Dev. Block)	Bilotia, Panbari, Tamulipather, Dhansiri Temera, Kolakhowa, Borpather, Dhoba ati, Beloguri, Kandulimari, Bamungaon, Porongonia, Japoripother, Diffolopather, Bohikhowa, Kalioni Block, Bongkuwal, Bortika, Aphola, Kemeri, Bhulukaguri, Lohorsapori, Goria (22)	1052.09	681.76	0.648
4	Jorhat	Ujani Majuli Dev. Block	Gezera & Anaichuk, Chikari Gaon & Lachan Dhunagaon, Molong, Panikhati, Kuhiyarbati, Morisuti, Major Deori & Petuajn Bali Deori, Mudoinbil, Chiram Deori, Bhati Duar, Teli Abani, Milonpur, Hatimuria & Baligaon, Ujoni & Namoni Chapori, Kumarabari, Jengrai Chapori & Bali Chapori, Jamud Chuk, Brinibari, Namoni Kolia, Jamuwari, Phuloni & Polongoni, Borpomua, Boroguri, Jorbil, Kathoni Ati, Borbam, Rongachahi, Missing Ranuchuk, Missing Bhuramora (30)	1200	416.40	0.347
		Dhekorgorah Dev. Block(North West Jorhat)	Bahfola, Kolbari, Bormukoli, Charigaon, Beiguri, Madhya Gorumora, Gandhali, Kakatichuk (8)	436.67	151.52	0.346
		Koliapani	Chumoni Chapori, Bejorsiga, Alisiga, Major	319.20	110.76	0.346

Sl.	District	Clusters/ Block	Villages	Area (ha)	Production (t)	Productivity(t/ha)
			Chapori, Bormathauri, Sagunpara (6)			
		Majuli Dev Block	Ghuria,Sakupara, Sarp- Misamara, Kordoiguri, Bhalukmora, Mororichuk, Adi Elengi, Malapindha, Gaon, Birinabari, Natun Chapori, Balichapori, Chitadar, Kulamua, Manikpur, Jakoibowa, Boli Jakoibowa, Puronibari, Garmur (19)	679.33	235.73	0.347
5	Sonitpur	Balipara	Akabasti Bengali, Siloni, Garmara, Nalghagori, Bhubulagaon, Baligaon, Rasgajan (7)	113.33	92.48	0.816
		Bihaguri	Johamari,Garua,Bordubai,Bihaguri (4)	144	117.50	0.816
		Naduar	Bodikorai, Towbhanga (2)	533	435.20	0.816
		Pub Choiduwar	Gajpuria, Dak Chapori, Upper Tinisukia No 1,2,3, Charaibari-1,2,3 (9)	260.93	236.41	0.906
	Total		**Villages= 180**	**8162.88**	**4993.93**	**0.612**
			Average Productivity of the clusters = 0.612 t/ha			

Black Gram Value Chain: Actors and Activities:

Activities	Input Supply	Production	Trading (in market)	Wholesale buying (mainly through CAs)	Retailing
Actors	Input dealer	Farmer	Traders	Commission Agents and Traders	Retailer, Provision Store owners
Support Services	Transport, Financial services, Storage	Extension, Transport, Credit	Transport, Credit, Storage	Transport, Credit, Storage	Storage, Transport
Location	Input market	Farm	Market	Market	Retail store, Neighborhood stores, Market

Availability and Access to Inputs:

Seed: Most farmers in the APART black gram cluster use local varieties, either self saved seeds and bought from other farmers or distributed through the Govt. PU-31 and KU 301 are the preferred varieties.

Agro Chemicals: Among the agrochemicals major one is Dimethoate, heavily used for the control of sucking pests like aphids and jassids and also to control the white fly which is the transmitting agent for Yellow Vein Mosaic Virus (YVMV). Among the fungicides Carbendazim is used for seed treatment.

There is no big market for sprayers and other tools and implements. These are often used on sharing basis and the bigger equipments are also rented out by few progressive farmers. Though seed drills are used for sowing of seeds, their availability is scanty.

Fertilizers: Under dosing of fertilizers is prevalent among the cluster farmers. Fertilizers are available from agri input dealer or cooperative depots.

Farmers on an average use 38 Kg/ha Urea, 75 Kg/ha SSP and 37.5/ha Kg MOP. *These quantities are below the proscribed doses as per recommended Package of Practices (PoP).*

Bio-fertilizers and bio-control agents are not demanded by Black Gram farmers from the input dealer. Neither there is use of any Plant Growth Regulators (PGRs).

Adoption of Package of Practices:

Recommended and actual Package of Practices (PoP) followed by Black Gram farmers in APART Clusters

S. No.	Practices	Recommended	Farmer Practice
1	Varieties	T-9, T-27, Pant U-9, T-122, Sonia Mah (SB 121) New: KU 101, USJD113	Local
3	Land Preparation	Ploughed 2-3 times and leveled	Ploughed 2-3 times and leveled, majority farmers use tractor
4	Time of sowing	Mid August to Mid Sep	Mid August to Mid Sep
5	Seed Treatment	Inoculation with Rihzobium culture	Carbendezim
6	Seed Rate	20-25 Kg/ha for line sowing 25-27 Kg for broadcasting	25 Kg/ha (Broadcasting)
7	Spacing	30*10 cm	30*10 cm
8	Method of sowing	Line sowing and broad casting	Line sowing (seed drill) and broad casting
9	Fertilizers	Urea=30 Kg/ha	Urea=38 Kg/ha
		SSP= 225 Kg/ha	SSP=75Kg/ha
		MOP=Nil	MOP= 37.5 Kg/ha
10	FYM	0.0173 MT/ha	Not used
11	Inter-culture	One weeding at 20-25 DAS	Hand weeding 30 DAS
12	**Insect Pests**		
	Aphids, Jassids, Flea beetles, Leaf folders, Pod bug, Pod	Malathion 50EC @ 1-1.5 Kg/ha in 100 liter water	Dimethoate 1.7 ml/l of water

S. No.	Practices	Recommended	Farmer Practice
	borer		
	White fly (for controlling the spread of YVMV)	Dimethoate or Endosulfan @ 2 ml/l of water	Dimethoate 1.7 ml/l of water
	Nematode-*Meliodogyne incugnaata*	Seed soaking with Carbosulfan 25EC @0.01%	No treatment
16	**Diseases**		
	Leaf Spot	Copper Oxy Chloride 0.3%	Carbendezim
	Blight	Carbendezim 0.05%	Carbendezim
	Harvesting	Starts when 75% of the pods mature	November to January

Cost of cultivation and Marketing

Cost of cultivation per hectare for Black gram

Cost/Recn. items	Units	Quantity	Rate	Total in INR
LABOUR				
Land preparation	Man day	6	220	1320
Sowing	DO	1	220	220
Manure application	DO	2	220	440
PP application	DO	1	220	220
Harvesting	DO	17	220	3740
Post harvest	DO	20	220	4400
Ploughing by Tractor	DO	3	1875	5625
Total Labour		**47**		**15965**
Inputs				
Seed	Kgs	25	150	3750.00
Urea	Kg	38	6	228.00
Super Phosphate	kg	75	8.5	637.50
Muriate of Potash	kg	37.5	12	450.00
Irrigation	Ls	3	300	900.00
Pesticide	LS			2975.00
Total Inputs				**8940.50**
TOTAL COSTS(INR)				**24905.50**
Production	**0.612 MT/Ha.**			
Sale Price	**Rs. 80000/MT**			
Income from Production (INR)		**0.612**	**80000**	**48960**
Net Profit(INR)				**24054.50**

Market:

The distance of the nearest market from the clusters is around 2-12 km distance. In the market auction doesn't happen rather one to one transactions take place. Farmers get around Rs. 70,000 per MT for fair quality Black Gram. Bold grain size and shiny black color is preferred by the market and fetches the highest price. The final moisture content of the grains should be around 9-10%. High moisture content reduces the quality as well as market price. Prolonged high moisture content may lead to fungal infestation.

Highest price offered in the market is Rs. 80,000/MT during September and then price goes down up to January. Lowest prices are offered in the month of January. Though there are no organized aggregators, only some amount of farm level buying happens. Concept of aggregators is negligible. Transportation is arranged and paid by the farmer himself. Storage structures do not exist in/ near the cluster.

Condition of roads and market infrastructure is poor.

There are no pulse processing/ dal mills nearby cluster. Local consumption with household processing is prevalent and little quantity moves out.

Market Information:

Input markets: The source of information and market intelligence for input dealers is the company executives who are in the field particularly those in the sales and marketing function (mainly on the use of agro-chemicals in this case as other inputs like seeds come from other sources). They also get information on package of practices by the company officials particularly when they attend field days, field visits and dealer visits on the standing crop but this information is confined mainly to the use (proper method and dosage) of that particular company's products. They also get a lot of information on

performance of new molecules/products coming into the market through their business network and other dealers and distributors of agricultural inputs. As a single dealer sells the products of 8-10 companies, he will have information on the products of all these companies. When dealer/distributor meets are organized by the company before (to give them sales targets and explain incentive schemes) and after (to recognize the target achievers) the sales season, there is lot of information exchange as apart from that particular company, each one is handling many different companies. In a nutshell, they are very good source of information but from a farmer's perspective this information is confined to the method of usage and dosage of the products of companies handled by them. *It essentially means that any information which does not have a business/profit angle will not be included in such communications*.

Farmer: The source of information to the farmer is fellow farmers, progressive farmers, agri input dealers and Government Agriculture Department functionaries like ATMA officials and Agriculture Extension Assistant (AEA). However, the farmer still does not get timely information on prevailing market prices which is utmost important to get good realizations. Customized (District and block level) timely information to cluster farmers on weather forecast is still a distant reality.

Output markets: Market traders get the information in the market itself and also through the business networks mainly through mobile phones. Wholesale buyers also get the information from their business network. Some wholesale buyers are also suppliers to organized pulse mills. They get information from their customer network, particularly on the industry trends, possible forecasts, trade routes and bulk movements of the commodity. In fact, some wholesale buyers are systematically integrated into the manufacturer processes through SAP Id, client profiles, vendor accounts etc. However, there are no pulse processing industries in the vicinity of clusters.

Retailers: The source of information for retailers is wholesale buyers and their business networks, consumers, etc.

Price mark up in black gram:

Sl.	Value Chain Actor	Buying price (Rs./MT)	Selling Price (Rs./MT)	Gross Margin (Selling – buying price)	Costs incurred (Rs./MT)	Net Margin (Rs./MT)	Share in Consumer's Rupee
1	Black gram farmer	40695(per tonne cost of cultivation) with high technical inputs)	80000	39305	Costs incurred by farmer Threshing=300 Loading=100 Transport=250 Unloading =100 Market fee=10 Paid to Commission Agent= 100 **Total=860**	38445	53
2	Market trader (buys from farmer through a commission agent)	80000	89600	9600	Costs incurred by trader (market buyer) Loading=100 Unloading =100 Transport=300 Market fee=10 Paid to Commission Agent=200 **Total =710**	8890	12
3	Wholesale buyer (buys from market trader through commission agent)	89600	98560	8960	Loading =100 Transport= 300 Other charges=100 Packing= 750 Paid to CA=100 **Total=1350**	7610	11
4	Retailer	98560	118270	19710	Labor = 150 Transport=400 Packing = 1000 Unloading= 100 Other charges=250 **Total = 1900**	17810	24
	Total	---	--	**77575**	**4820**	**72755**	**100**

Margin of aggregator and wholesaler to be passed onto farmer with coming of FPO and CSC

Critical Constraints:

Many gaps are identified in the black gram clusters of APART. The prominent gaps are the followings:

1. Unavailability of improved seeds and use of local seed
2. Lack of line sowing resulting in inadequate plant population
3. Lack of adoption of recommended package of practices, especially application of phosphatic and potassic fertilizers and plant protection measures
4. Inadequacy of the recommended package of practices
5. Inadequate extension and marketing support
6. Lack of farm level post-harvest management and value addition

Upgrading Strategy:

For the identified challenges in APART black gram clusters, following up gradation strategies are suggested:

Sl.	Challenge/Issue	Strategy
	Low area coverage and need to expand the same	**Extensive campaign to educate farmers about benefits and economics of pulses production following harvest of rice**
1	Unavailability of improved seed	Seed production capacity of AAU and farmers will be augmented. Technical assistance will be taken from World Vegetable Centre for green gram and black gram and in general from Indian Institute of Pulses Research (IIPR) Kanpur.
2	Lack of line sowing and inadequate plant population	Provision of seed drill and organizing on farm demonstrations
3	Inadequacy of recommended Package of Practices (PoP)	Package of practices will be updated for promoting cultivation of summer black gram (January-April)
4	Lack of adoption of Package of Practices (PoP)	On-farm demonstrations and farmer trainings will be organized to promote adoption of recommended PoP
5	Inadequate extension and marketing support	ATMAs will be strengthened to provide improved production and marketing support to farmers, and promote adoption of updated PoP. Also warehouse receipts will be operationalized to mitigate market risks
6	Lack of farm level post-harvest management and value addition	Farmer operated Common Service Centers (CSCs) will be set up for post-harvest management and value addition; and for better access to input and output markets Basic milling can be planned at selected CSCs where arrivals are in sufficient volumes and electric power is available

Action Plan:

Seed availability: One of the major constraints for area expansion during rabi season is lack of availability of right varieties in respect of duration an suitable plant architecture. This is proposed to be addressed through augmentation of seed production capacity of AAU and selected farmers with technical inputs from World Vegetable Centre and IIPR.

Updating Package of Practices: AAU will update Package of Practices for cultivation of black gram (especially summer crop sown in January/February). Inputs from World Vegetable Center will also be used while updating PoP. The updated PoP will be disseminated to farmers through pamphlets laying emphasis on adoption of high payoff interventions.

Mobilization and Organization of Farmers: Groups of black gram farmers will be formed and organized into producer organizations. They will be provided training in improved methods of black gram cultivation by field staff of ATMAs and AAU KVKs.

Organizing On-Farm Demonstrations and Farmer Trainings: Appropriate number of on-farm demonstrations and related farmer trainings will be organized for dissemination of improved seeds and production practices for cultivation of black gram to the farmers. Farmers will be provided seed drill through CSCs for promoting line sowing of the crop. Adoption of the demonstrated technologies in the years following organization of demonstrations will be documented in terms of increase in productivity and expansion of area under the crop. Detailed guidelines for organizing and monitoring demonstrations are given in Annex -1.

Post-Harvest Management, Value Addition and Marketing: Farmer operated Common Service Centers (CSCs) will be used for cleaning, grading, aggregating and packaging of produce. In order to minimize price risks, the facility of warehouse receipts will be also available to farmers. Farmer Producer Companies and CSC operated by them will also help member farmers in accessing input markets for seeds, fertilizers and other inputs, and storage of produce in ASWC go downs for accessing warehouse receipts.

Value Chain Development Plan (VCDP) for Vegetables

Introduction

Assam grows a large number of vegetables, in both summer and winter season; some of which are indigenous to Assam. However, area and production of winter vegetables are more because of vacant land during the season. Also, there is a great diversity of vegetables available in Assam. The state has an Area of 2,77,950 ha under vegetables with a production of 50,11,603 MT. Most of the vegetables, being short duration crops, fit very well in the intensive cropping system and are capable of giving very high yields and very high economic returns to the growers besides providing better health standards to the people..

Prominent vegetables grown in Assam are tomato, potato, cucurbits, beans, onion, cabbage, cauliflower, brinjal, green leafy vegetables etc. APART will lay special emphasis mainly on selected rabi season vegetables or winter vegetables as mentioned below.

Area, production and productivity of major vegetables in APART districts (Area in ha, production in tones and productivity in t/ha)

Sl.	District	Brinjal			Cabbage			Cauliflower			Tomato			Cucurbits(Pumpkin)		
		A	P	A/Y	A	P	A/Y	A	P	A/Y	A	P	A/Y	A	P	A/Y
1	Barpeta	957	17208	17981	2960	65318	22067	1288	48131	37369	924	23724	25675	12	301	25083
2	Cachar	863	11133	12900	1795	31173	17367	875	10915	12474	1008	23078	22895	96	1808	18833
3	Darrang	744	10066	13530	1902	38270	20121	1806	57602	31895	1197	20464	17096	94	2434	25894
4	Dhubri	916	11817	12901	1967	38230	19436	1184	30042	25373	1118	27995	25040	50	1467	29340
5	Goalpara	568	7535	13266	722	12082	16734	567	8355	14735	502	10876	21665	20	349	17450
6	Golaghat	717	9145	12755	1351	27689	20495	1084	25667	23678	652	15449	23695	40	982	24550
7	Jorhat	451	6298	13965	1146	23690	20672	669	10550	15770	497	13270	26700	50	1017	20340
8	Kamrup (M)	648	7692	11870	676	15308	22645	1399	40593	29016	866	11949	13798	42	862	20524
9	Kamrup (R)	769	18338	23847	1701	25852	15198	1117	27453	24577	678	25312	37333	75	2170	28933
10	K. Anglong	393	5390	13715	467	10832	23195	375	5295	14120	370	9185	24824	96	2832	29500
11	Kokrajhar	470	6049	12870	1102	30106	27319	756	13513	17874	437	9299	21279	20	353	17650
12	Lakhimpur	986	20638	20931	1276	26383	20676	756	11918	15765	348	12479	35859	43	376	8744
13	Morigaon	816	17516	21466	491	8684	17686	471	6914	14679	765	10396	13590	90	2116	23511
14	Nagaon	984	21950	22307	2881	44345	15392	1434	35482	24743	1184	23222	19613	162	5733	35389
15	Nalbari	620	7270	11726	1552	31785	20480	1129	24226	21458	843	28794	34157	30	931	31033
16	Sibsagar	237	3206	13527	976	22487	23040	500	7390	14780	850	16736	19689	35	310	8857
17	Sonitpur	684	8894	13003	797	16244	20381	717	10493	14635	665	15817	23785	65	1016	15631

Vegetable Clusters

1. Solanaceous Crops –

a. Tomato

Sl.	District	Block/Clusters	Villages	Area (ha)	Production (t)	Productivity (t/ha)
1	Barpeta	Bhawanipur	Duttakuchi, Jogerpam, Dhakaliapara, Kadamguri, Dabaliapara, Kaljhar, Kujarpith, Khanderpar, Hatijana, Fulkipara, Bhulikabari Gaon, Kumulipara, Baniarapara, Hajipara, Isopara, Deulipara, Jaharpam (18)	95	2439.13	25.675
		Gobordhana	Dumuni, Khoirabari, Manipur, Meshpara, Guagacha, Borbari, Baguriguri, Karagaon, Khuduabari (9)	50.67	1027	20.268
2	Cachar	Borkhola	Naraincherra, Borkhola, Bijoypur, Anwapar(4)	80	1831.60	22.895
		Kalain	Jalalpur I, II, Rongpur, Mohadebpur I,II,III (6)	50	1144.75	22.895
		Silchar	Niagram & Bagpur, Bernga, Bagadhawar, Borjura (4)	60	1373.70	22.895
3	Darrang	Dalgaon Sialmari	Niz Kharuypetia, Ojagaon, Bologorah, Islampur, Baigarmari, Keot Chuba, N. C. Kharupetia, No. 1 & 2 Bahbari, Kamarpara, Barhoipara, Ondolajhar, Gelaidingi, Dhansirikash, No. 1 Ga Dhowa, Gadhowa Chapori, No. Golandi, No.3 Golandi, Duliapara, Shimulbari, Bagharbari, No.2 Kuwaripukhuri, Bihudia, Khagjani, Alikash Sialmari, 2 Kacharivatitup, No. 3 Kacaharrivatitup, Silbori, Kapatigaon	432	4422.17	10.237

Sl.	District	Block/Clusters	Villages	Area (ha)	Production (t)	Productivity (t/ha)
			(29)			
		Paschim Mangaldoi	Barthekerabari, Saruthekerabari, Gar Khowapara, Bhalukkhowapara, Bhanguri, Chuba, Dariapara, Niz Ragngamati, Bangalpara, Sadau Mara (10)	230.67	3943.48	17.096
		Pub Mangaldoi	Puthimari, Koyaman, No. 3 Nanglichar, Piyajar Char, Kajia Char, North Gossabari, South Gossbari (7)	86.67	1481.65	17.095
		Sipajhar	Dakhin Kuuaral 1 & 2, Bhati Kutura, Pachim Kurua, N.C. Kurua, Hatimura, Ruparikash, Dasotani, Chaladoi, Rajapukhuri(10)	86.67	1322.09	15.254
4	Golaghat	Padumoni (East Golaghat Dev Block)	Dachamua, Kathkotia, Guwaltup (3)	86.67	3238.32	37.364
		Gomariguri	Gomari, Torani, Navajyoti (3)	200	4739	23.695
5	Kamrup	Goroimari	Chowtara (1)	53.33	1991.09	37.335
		Hajo	Bor Hardia (1)	53.33	1991.09	37.335
6	Kokrajhar	Kokrajhar	Nadanguri, Najanguri (2)	68	567.74	8.349
7	Nalbari	Barkhetri	Bhangnamari Char,1 No. Larkuchi, 2 No. Larkuchi, Loharkatha, Kuriharmarichar (5)	147.33	5032.46	34.158
8	Sivsagar	Demow	Bordiroi, Deroihabi (2)	50	787.56	15.751
		Gourisagar	Khoradhara, Roghuguri (2)	50	787.56	15.751
9	Sonitpur	Borsola	Tintika Chapori (1)	88	2093.08	23.785
		Dhekiajuli	2 No Rongagara, Patidoi Verela, Bash bera (A) (3)	82	1950.37	23.785
		Nagshankar	Tengabasti (1)	120	5854.20	48.785
		Baghmora	Nizambaghmari (1)	50	1189.25	23.785
	Total	**Blocks=21**	**No. of villages= 122**	**2220.34**	**49207.29**	**22.162**

b.Brinjal

Sl	District	Block/ Cluster	Villages	Area (ha).	Production (t)	Pty (t/ha)
1	Cachar	Borkhola	Bagadhwar Borjurai, Naraicherra, Borkhola, Bijoypar, Anwapar(5)	100	1290.00	12.90
		Narsingpur	Berabak III, Kazidhar III, Nandigram I, II, III ,Puthikhal, Clever House, Panibhoral, Channighat, Aradhanpur I, Rajghat, Saptagram(12)	60	774.00	12.90
		Palongghat	Ram Manikpur, Mohankhal, Didarkush I, Kalakhal(4)	80	1032.00	12.90
2	Darrang	Bechimari	Kakabhangi,Batabari No. 5, Barujahar, Jamalpur, Baligaon,Nagaon, Namati, Chukhahati, Alisinga Jangal, Dalgaon Khuti, Dwarpar, Kahibari, Sarisabari, Bechimari, Baruajhar, Dongpara, No. 3 Baruajhar, No. 4 Baruajhar, Daipam, Simaluguri, Chakarbasti, Khairakata, Takimari, No. 3 Madhoggohaing, No. 2 Chikanmati, No. 2 Borgorakhuti, Baruapara, Borgaga, Bagisa Gaon, Borgora,Tea, Chikanmati Tea, Dalgaon Town, Chakargaon, Gorkhakhat No. 1, Borgorakhuti, Niz Dalgaon, No. 1 Borujhar,, No. 2 Borujhar, Borujhar Grant No. 1, Darrang Bahajhar, No. 3 Darrang Barajhar, Madhupur, Nadirkash, Bechimari, Jangal, Gendapukhuri, No. 1 Chikanmati Borghuri(48)	181.33	2453.44	13.53
		Dalgaon-Sialmari	Niz Kharupetia, Ojagaon, Bologorah, Islampur, Baigarmari, Keot Chuba, N. C. Kharupetia, No. 1 & 2 Bahbari, Kamarpara, Barhoipara, Ondolajhar, Gelaidingi, Dhansirikash, No. 1 Ga Dhowa, Gadhowa Chapori, No. 2 Golandi, No.3 Golandi, Duliapara, Shimulbari, Bagharbari, No.2 Kuwaripukhuri, Bihudia, Khagjani, Alikash Sialmari, 2 Kacharivatitup, No. 3 Kacaharrivatitup, Silbori, Kapatigaon(28)	174.67	2863.24	16.39
		Pachim Mangaldoi	Barthekerabari,Saruthekerabari, Gar Khowapara, Bhalukkhowapara, Bhanguri Chuba, Dariapara, Niz Ragngamati, Bangalpara, Sadau Mara(9)	60.00	811.80	13.53
3	Goalpara	Jaleswar	Takimarai,Kharubhaj,Tarangapur(3)	115.33	1503.48	13.03
4	Jorhat	Dhekorgorah Dev. Block(North West Jorhat)	Madhya Gorumora,Nam Deori,Chari Gaon,Nam Gorumora, Malowkhat(5)	330.67	4617.16	13.96
		Koliapani Block	Kumar gaon,Bajarsiga,Azarguri(3)	61.07	852.80	13.96
5	Kamrup	Hajo	Nodia(1)	53.33	1271.84	23.84
		Sualkuchi	Singimari(1)	133.33	3179.60	23.84
6	Lakhimpur	Karunabari	Merbil,Kachajuli, Lakhanabori(3)	300.00	6279.30	20.93
		Naoboicha	Phulbari Bosti(1)	100.00	2093.10	20.93
7	Marigaon	Mayong	1 No. Murkata, 2 No. Murkata, Patakibori(3)	286.67	6153.59	21.46

Sl	District	Block/ Cluster	Villages	Area (ha).	Production (t)	Pty (t/ha)
8	Nagaon	Batadrava	Kandhulimari, Sologuri(2)	147.46	3289.39	22.30
		Kaliabor	Uttar & Dakhin Bhomoraguri,Uttar & dakhin Putakolong,Tubukijaroni,Mohaborali(6)	86.67	1933.27	22.30
		Laokhowa	Bhurbandha1to4(4)	86.93	1939.22	22.30
9	Nalbari	Barkhetri	1 No. Larkuchi, 2 No. Larkuchi, Kuriharmarichar,Bhangnamari Char, Loharkatha(5)	112.67	1321.13	11.72
	Total	**18 blocks**	**143 Villages**	**2470.13**	**43658.36**	**17.67**

Cole crops

a. Cabbage

Sl	District	Block/ Cluster	Villages	Area (ha)	Production (t)	Pty (t/ha)
1	Cachar	Borkhola	Naraincherra, Borkhola, Bijoypur, Anwapar(4)	80	1389.36	17.36
		Narsingpur	Nagdirgram I, II,III , Berabak III, Kazidahar III(5)	80	1355.36	16.94
		Udarband	Kashipur II & Rongpur I , Dayapur I & II(4)	60	1042.02	17.36
2	Darrang	Bechimari	Kakabhangi,Batabari No. 5, Barujahar, Jamalpur, Baligaon,Nagaon, Namati, Chukhahati, Alisinga Jangal, Dalgaon Khuti, Dwarpar, Kahibari, Sarisabari, Bechimari, Baruajhar, Dongpara, No. 3 Baruajhar, No. 4 Baruajhar, Daipam, Simaluguri, Chakarbasti, Khairakata, Takimari, No. 3 Madhoggohaing, No. 2 Chikanmati, No. 2 Borgorakhuti, Baruapara, Borgaga, Bagisa, Gaon, Borgora,Tea, Chikanmati Tea, Dalgaon Town, Chakargaon, Gorkhakhat No. 1, Borgorakhuti, Niz Dalgaon, No. 1 Borjhar,, No. 2 Borjhar, Borjhar Grant No. 1, Darrang Bahajhar, No. 3 Darrang Barajhar, Madhupur, Nadirkash, Bechimari, Jangal, Gendapukhuri, No. 1 Chikanmati Borghuri(48)	777.33	15640.72	20.12
		Dalgaon-Sialmari	Niz Kharupetia, Ojagaon, Bologorah, Islampur, Baigarmari, Keot Chuba, N. C. Kharupetia, No. 1 & 2 Bahbari, Kamarpara, Barhoipara, Ondolajhar, Gelaidingi, Dhansirikash, No. 1 Ga Dhowa, Gadhowa Chapori, No. 2 Golandi, No.3 Golandi, Duliapara, Shimulbari, Bagharbari, No.2 Kuwaripukhuri, Bihudia, Khagjani, Alikash Sialmari, 2 Kacharivatitup, No. 3 Kacaharrivatitup, Silbori, Kapatigaon(28)	810.67	16311.42	20.12
		Pachim Mangaldoi	Barthekerabari,Saruthekerabari, Gar Khowapara, Bhalukkhowapara, Bhanguri, Chuba, Dariapara, Niz Ragngamati, Bangalpara, Sadau Mara(10)	180.00	3621.78	20.12
		Pub Mangaidoi	Puthimari, Koyaman. No. 3 Nanglichar,Piyajar Char,Kajia Char, North Gossabari, South Gossbari(7)	160.00	3119.36	19.49
		Sipajhar	Dakhin Kuuaral 1 & 2, Bhati Kutura, Pachim Kurua, N.C. Kurua, Hatimura, Ruparikash, Dasotani, Chaladoi, Rajapukhuri(7)	160.00	3219.36	20.12
3	Goalpara	Jaleswar	Rajmita(1)	73.33	1227.16	16.73
		Lakhipur	Saktola,Khonarpubpar(2)	66.67	1115.6	16.73
4	Jorhat	Dhekorgorah Dev. Block(North West Jorhat)	Lolity, Nam Gorumora, Baliati, Dorikamari(4)	200.00	4134.00	20.67
		Koliapani Block	Dulia, Tenga Bari, Rankham, Azarguri, Bajorsiga, 1 NO. Kawoimari, 2 No. Kawoimari, Kumar Gaon, Chumoni Chapori,,Pirrakata Duara Gaon(11)	167.07	3453.60	20.67
		Ujani Majuli Dev. Block	Kulichapori,Salmari, Natun Mowmari, Haldhibari, College Colony, Major Deori, Petuajan, Balideori, Molong, Kuhiyabari, Katia Chuk, Morisuti, Katia Chapori, Mudoibori, Phuloni, 2 NO. Phuloni, Polongoni, Pohumora, Pohumora Kaliat Gaon, Jadavpur, Jurbil Mainachuk, Guwalbari(23)	80.00	1653.76	20.67
5	Kamrup	Goroimari	Tukrapara(1)	66.67	1013.20	15.19

Sl	District	Block/ Cluster	Villages	Area (ha)	Production (t)	Pty (t/ha)
		Hajo	Hahdia(1)	66.67	1013.20	15.19
6	Lakhimpur	Karunabari	Kherbori,Oahat,Merbil,Lakhanbari(4)	400.00	8270.40	20.67
7	Nagaon	Bajiagaon	Gatanga, Kanuarmari,Chakitup, Bhumuraguri,Sonaribali,Khalihamari, Sialkhtai,Garumara, Erakalong(9)	107.60	1656.18	15.39
		Batadrava	Bhumuraguri, Sologuri(2)	53.33	820.91	15.39
		Dhalpukhuri	Punjabasti, Nagalbhnaga(2)	66.80	1028.19	15.39
		Juria	Chenimari Beel(1)	72.40	1114.38	15.39
		Laokhowa	Bhurabnadha, Uttar Beloguri & Mahabaradi, Uttar & dakhin Bhomoraguri(5)	130.13	2003.01	15.39
8	Sivasagar	Demow	Gayan gaon, Harudiroi(2)	53.33	921.60	17.28
9	Sonitpur	Balipara	Balisuti, Ashurmari, Rowmari, Gormora(4)	104.67	542.17	5.17
		Bihaguri	Bhumuraguri, Kerani Block(2)	114.67	2337.02	20.38
		Dhekiajuli	Punioni,Amolapam, Chariduar, Akasbasti Bengali(5)	92.00	1875.05	20.38
		Gabharu	Bhumuraguri, Kerani Block(2)	114.67	2337.02	20.38
		Nagshankar	Habidoloni(1)	76.67	1562.54	20.38
		Pub-Choiduar	Majpichala (Ouguri), Sesabil (2)	65.33	1331.56	20.38
	Total	**28 blocks**	**197 Villages**	**4480.01**	**85243.94**	**19.02**

b.Cauliflower

S. No	District	Block/ Cluster	Villages	Area (ha).	Production (t)	Pty (t/ha)
1	Barpeta	Chakchaka	Nichuka, Chengulia, Kalahbhanga, Sorbhog Gaon, Balavita, Raipur, Joshitati, Puthimari, Shahpur, Bandarkhowa, Sorbhog Gaon(11)	70.00	2615.83	37.36
		Gobordhana	Dumuni,, Khairabari, Nanipur, Katajharpathar(4)	80.00	2989.52	37.36
2	Cachar	Borkhola	Naraincherra, Borkhola, Bijoypur, Anwapar(4)	80	997.92	12.47
		Narsingpur	Nandigram I, III, IV, Berabak III, Kazidahar I(5)	60	748.44	12.47
		Silchar	Niagram & Bagpur, Bernga, Bagadhawar, Borjurai(5)	60	748.44	12.47
3	Darrang	Bechimari	Kakabhangi, Batabari No. 5, Barujahar, Jamalpur, Baligaon,Nagaon, Namati, Chukhahati, Alisinga Jangal, Dalgaon Khuti, Dwarpar, Kahibari, Sarisabari, Bechimari, Baruajhar, Dongpara, No. 3 Baruajhar, No. 4 Baruajhar, Daipam, Simaluguri, Chakarbasti, Khairakata, Takimari, No. 3 Madhoggohaing, No. 2 Chikanmati, No. 2 Borgorakhuti, Baruapara, Borgaga, Bagisa Gaon, Borgora,Tea, Chikanmati Tea, Dalgaon Town, Chakargaon, Gorkhakhat No. 1, Borgorakhuti, Niz Dalgaon, No. 1 Borujhar,, No. 2 Borujhar, Borjhar Grant No. 1, Darrang Bahajhar, No. 3 Darrang Barajhar, Madhupur, Nadirkash, Bechimari, Jangal, Gendapukhuri, No. 1 Chikanmati Borghuri(48)	788.00	25133.26	31.89
		Dalgaon-Sialmari	Niz Kharupetia, Ojagaon, Bologorah, Islampur, Baigarmari, Keot Chuba, N. C. Kharupetia, No. 1 & 2 Bahbari, Kamarpara, Barhoipara, Ondolajhar, Gelaidingi, Dhansirikash, No. 1 Ga Dhowa, Gadhowa Chapori, No. 2 Golandi, No.3 Golandi, Duliapara, Shimulbari, Bagharbari, No.2 Kuwaripukhuri, Bihudia, Khagjani, Alikash Sialmari, 2 Kacharivatitup, No. 3 Kacaharrivatitup, Silbori, Kapatigaon(28)	745.33	23772.41	31.89
4	Goalpara	Jaleswar	Rajmita(1)	66.33	785.87	11.84
		Lakhipur	Saktola,Khonarpubpar(2)	73.33	1080.57	14.73
5	Jorhat	Dhekorgorah Dev. Block(North West Jorhat)	Lolity,Nam Gorumora, Madhya Gorumora, Baliati, Upor Deori, Bahfola,(6)	200.00	3154.00	15.77
		Koliapani Block	Azarguri, Pirrakata Duara gaon, 2 No. Kawaoimari, Bajorsiga, 1 No. Kawoimari, Kumar Gaon, Chumoni Chapori(7)	147.20	2321.34	15.76
		Ujani Majuli Dev. Block	Kuli Chapaori, Salimari, Natun Mowmari, Haldhibari, College Colony, Major Deori, Petuajan Bali, Deori Molong, Kuhyaribari, Morisuti, Katia Chapori, Mudhoibil, Phuloni,	80.00	1261.60	15.77

S. No	District	Block/ Cluster	Villages	Area (ha).	Production (t)	Pty (t/ha)
			Jamuwaoni, 2 NO. Phuloni, Polongonoi, Pohumara, Pohumara Klaita Gaon, Jadavpur, Jurbi, Maina Chuk, Guwalabari(23)			
6	Kamrup	Goroimari	Jahirpur(1)	66.67	1638.47	24.57
		Hajo	Hahdia(1)	66.67	1638.47	24.57
7	Kokrajhar	Kokrajhar	North Baragarh, South Baragarh, Barmanpara(3)	53.33	810.29	15.19
8	Lakhimpur	Karunabari	Kherbori, Oahat, Merbil, Lakhanabori(4)	200.00	3153.00	15.76
9	Nagaon	Batadrava	Bhumuraguri, Sologuri(2)	194.00	4800.14	24.74
		Binnakandi	Mikirpar, Sadargaon(2)	51.33	1270.14	24.74
		Dhalpukhuri	Punjabasti,Nagalbhnaga(2)	111.07	2748.12	24.74
		Juria	Chenimari beel(1)	75.60	1870.57	24.74
		Laokhowa	Bhurabnadha, Uttar Beloguri & Mahabaradi, Uttar & dakhin Bhomoraguri(5)	127.07	3144.01	24.74
10	Sonitpur	Bihaguri	Kamarchuburi(1)	228.67	3346.54	14.63
		Dhekiajuli	Rangajan,Akabasti Bengali,Amolapam(3)	78.67	1151.29	14.63
		Nagshankar	Habidolini,Samarohdoloni(2)	123.33	1804.98	14.63
	Total	**24 blocks**	**168 Villages**	**3826.60**	**92985.22**	**24.29**

Cucurbits (Pumpkin)

Sl.	District	Block/ Cluster	Villages	Area (ha).	Production (t)	Pty (t/ha)
1	Barpeta	Chenga	Kachumara, Mahchara, Chata, Balartari,Rowmarigaon(5)	55.00	1379.57	25.41
		Gobordhana	Bogoriguri, Khudnabari,Mechpara, Bahbari, Guagacha(5)	50.00	1128.74	22.57
		Sarukhetri	Jashodharpam, Bogchera,Garertari(3)	65.00	1630.40	25.08
2	Cachar	Banskandi	Gobindapur & Algapur, Dungipar,& Gangapar(4)	60	1129.98	18.83
		Palongghat	Saint Ketharine, Ram Manikar, Mohankhal, Patbari(4)	80	1506.64	18.83
		Udarband	Kashipur I & II,Chandighat III, Pangram I & II, Dayapur I & Durganagar VI, Siberband & Chandighat, Patimara & Tikol(11)	120	2259.96	18.83
3	Golaghat	Kakodonga	Adharsatra, Khumtai,(2)	213.33	5237.33	24.55
4	Jorhat	Dhekorgorah Dev. Block(North West Jorhat)	Malowkhat, Rajakhat, Dawgaon, Neul Gaon, Upor Deori, Upor Gorumora(6)	156.67	3186.60	20.33
		Koliapani Block	Azarguri, Hatiosal, Ghurchora, Bajorsiga, 1 No. Kaowoimari, 2 No. Kawoimari, Kumar gaon, Bhakat Gaon(8)	189.20	3848.33	20.33
		Titabor Block	Phalengi Chuk, Layaet Na Chungi, Lalung Bengenakhuwa, Tengajan, Panajon, Phulbari, Panimora, Bandarchalai(10)	59.07	1141.75	19.32
5	Nagaon	Barhampur	Hyangthal,Gohaigrant(2)	72.00	1160.79	16.1
		Jugijan	Jamunasit, Dorjisit(2)	85.00	1302.35	15.32
		Kathiatoli	Saibukgaon, Longjap,(2)	50.00	1613.78	32.27
		Pakhimaria	Uiagaon, Deurigaon, Borpathori, Borjoha, Borkhola(5)	78.00	1561.88	20.02
	Total	**14 blocks**	**69 Villages**	**1333.27**	**26785.74**	**20.09**

Vegetable Value Chain Actors and Activities

Activities	Input Supply	Production	Wholesale buying	Retailing	End user
tors	Input dealer	Farmer	Wholesalers or Traders	Retailers	Customers Hotels
Support Services	Financial services	Extension, Transport,	Transport, Credit, Storage	Storage, Transport	Consumption
Location	Input market	Farm	Market	Market, Roadside vendor	Various locations

Input Availability

Solanaceous Crops

Tomato

Seed: The Tomato growing farmers are mostly preferring to the Varieties like Abhinav (Syngenta), Avinash, Pusa Kesari, Pusa Ruby, Arka Abha (BWR-1), etc., because of higher yields. These new varieties are available with the Private companies' retail outlets.

Agrochemicals: Late blight and Bacterial wilt are the major problems in tomato cultivation. Blight is controlled using CM-75 (Mancozeb+Carbendezim) while for bacterial wilt, farmers use Asafoetida and bactericides. For controlling sucking pests, cut worms and soil pests Profenophos. Rogor/Alpha/Tarzan is used. The chemicals are available in the retail outlets.

Brinjal

Seeds: Most farmers in the clusters use hybrid seeds being sold by Multinational/ National private seed companies. Some of the leading varieties are - US-45, US-618, Pusa Purple Round, Pusa Purple Long.

Agrochemicals: The major pest of brinjal is the fruit and shoot borer, followed by nematode. Therefore use of Carbofuran is more common in brinjal cultivation. Sometimes growers use chemicals like Profenophos. Rogor/Alpha/Tarzan against of cutworms and other minor pests. Major diseases are Bacterial and Fungal wilt. Farmers use Bactericides like Agromycin, Streptomycin and Carbendazim, CM-75 (Mancozeb+Carbendezim) against bacterial and fungal wilts. The chemicals are available in the retail outlets.

Cole crops

Cabbage:

Seeds*:* All cabbage farmers use mostly hybrid varieties. They choose the variety based on their past experience, based on fellow farmers' suggestions, based on the company name and also based on the suggestion from the input sellers. Major used varieties are NS-43 (Namdhari), Summer Queen (Syngenta) in Early season, Wonder Ball (Monsanto), Rear Ball (Sakata), B.C.- 76 (Syngenta) are the mid-season Varieties, B.C. – 90 (Syngenta), Questo (Syngenta), 455 (UPL), Arun (Pahuja) are late season varieties. Rear Ball (Sakata) used as common season variety which produces big & tasty heads, preferred in market. These seeds are available with the Private companies' retail outlets.

Agro Chemicals: Black rot and Leaf spot are the major diseases and Caterpillars, leaf eaters, Cut worms and red ants are common insects damaging the crop, the major chemicals used are Zirum (Cumenel™ Syngenta), Carandizium+ Mancozeb (Saff) for Black rot, Bavistin & Captan for leaf spot, Novaluron10EC (Ramon™ Indofil), Novaluron 5.25%+Indoxicarp (Plethora™ ADAMA), Profenofos+ Cypermethrin, Chloropiripos+ Cyprmethrin, Alfa-Methrin for Diamond Back Moth, Imidachloprid, Asitamiphate20%WP (EKKA™ Krishi Rasayan), Thiametoxan25% (Actara™ Syngenta) for sucking pests. The chemicals are available in the retail outlets.

Cauliflower

Seeds*:* Cauliflower farmers use only hybrid seeds. Like Cabbage, they choose it based on their past experience, or based on fellow farmers' suggestions, based on the company name and also based on the suggestion from the input seller. Major ruling varieties are Shighra (Golden seeds), Down (Monsanto), Ati Shighra (Namdhari), Mareet (East West Seeds), White Shot (Sakata), Kimakya (Syngenta) in early season varieties, sown from June to Aug, Megha (Monsanto), Kimakya (Syngenta), Girija (Monsanto) in Mid-season varieties, sown from Aug to Oct, Tretris (Syngenta), Madhuri (Clause Intl) in late season varieties. These seeds are available with the Private companies' retail outlets.

Agrochemicals: Black rot and leaf spot are the major disease and Diamond Back Moth and and Caterpillars, leaf eaters, Cut worms and red ants are common pests. So the major used chemicals in Cauliflower are, Zirum (Cumenel™ Syngenta), Carandizium+Mancozeb (Saff) for Black rot, Bavistin & Captan for leaf spot, Novaluron10EC

(Ramon™ Indofil), Novaluron5.25%+Indoxicarp (Plethora™ ADAMA), Profenofos+ Cypermethrin, Chloropiripos+ Cyprmethrin, Alfa-Methrin for Diamond Back Moth, Imidachloprid, Asitamiphate20%WP (EKKA™ Krishi Rasayan), Thiametoxan 25% (Actara™ Syngenta) for sucking pest. The chemicals are available in the retail outlets.

Cucurbits (Pumpkin**)**

Seeds: Hybrid varieties viz. Arjuna and Arka Chandan of Chakra, Mahyco and Pahuja companies are commonly used. Local varieties are also grown along with hybrids; because local variety has high demand for local people due to its taste, color and shelf life. The local cultivar seeds are made from last season cultivation by drying the fruits and hybrid varieties are available in the retail outlets.

Agrochemicals: The major pests of pumpkin are fruit fly and pumpkin beetles. Farmers generally use Rogor/Alpha/Tarzan/ Malathion for their control. Among diseases powdery mildew and downy mildew are common for which chemicals like Karathanes are used by farmers.

Adoption of Package of Practices

Cole crops

Cabbage

Sl.N	Practices	Recommended	Actual Practice by Farmers
1	Varieties	**Early Maturing:** Golden Acre, Pride of India, Pusa Mukta **Late Maturing:** Drum Head, Eclipse Drum Head	Early maturing preferred - Wonder ball (Monsanto), Rear ball (Sakata), B.C. 76 &B.C. 90 (Syngenta)
2	Land Selection	Well drained sandy loam. pH 5.5 and 6.5	Well drained sandy loam. pH 4.2 to 5.8
3	Field Preparation	Thorough ploughing to obtain deep fine tilth	5 times ploughing is done, 90% farmers use tractors & 10% farmers use bullocks.
4	Time of sowing	1st week of Sept to last week of Nov	Sept 1st week to Nov last week
5	Seed Rate	0.8 kg/ha (early maturity) 0.45kg/ha (late maturity)	0.75 kg /Ha
6	Spacing	60cm*30cm(early maturity) 60cm*60cm(late maturity)	30cm*25cm
7	Method of sowing	Seed bed is prepared and then seedling raising	Seed bed is prepared and then seedling raising
8	Fertilizers	Urea= 260 kg/ha ; SSP= 375 kg/ha. MOP= 100 Kg/ha ; Borax= 8Kg/ha	Urea= 325 Kg/Ha; SSP= 375 Kg/Ha MOP= 40 Kg/Ha *90% of farmers won't use Borax
9	FYM	10 tons /Hectare	5 tons /Hectare
10	Weeding	1st weeding 20days after transplanting 2nd weeding 40days after transplanting	2 times weeding & Earthing up is done manually
11	Leaf eating insects	Malathion 50EC @ 1.5 ml / li of water (0.15%)	Profenofos + Cypermethrin Novaluron5.25% + Indoxicarp (Plethora™ ADAMA)
12	Cutworm, cricket, Red ant	Malathion 5% dust @ 20 kg / Ha	Soil application of Phorate or Furadon,10 – 15 kg/Ha, Imidachloprid,
13	Black rot	Drenching of Agrimycin or Streptomycin (0.1 - 0.2g/li)	Zirum (Cumenel™ Syngenta), Carandizium+Mancozeb(Saff)
14	Irrigation	Soil should be kept moist always	Irrigated only in critical condition, *irrigation problem
15	Harvesting	When the head attain proper size.	When the head is proper size.
16	Yield	20 – 25 Mt / Ha	22 Mt/Ha

Cauliflower

S. No.	Practices	Recommended	Actual Practice by Farmers
1	Varieties	**Mid:** Improved Japanese, Pusa Synthetic, Pusa Snowball & Main Crop Patna **Late:** Snowball-16, Pusa Snowball, K-1 & Hissar 1	**Mid:** Mega (Monsanto), Kimakya (Syngenta), Shigra (Golden seeds) **Late:** Tretris (Syngenta) Madhuri (Clouse)
2	Land Selection	Well drained loam to clay loam **pH 5.5-.6**	Well drained sandy loam. **pH 4.2 to 5.8**
3	Field Preparation	Thorough ploughing to obtain deep fine tilth	5 times ploughing is done, 90% farmers use tractors & 10% farmers use bullocks.
4	Time of sowing	**Mid:** 1st week of Sept to last week of Oct **Late:** Up to 1st week of November	Aug last week to Nov 1st week
5	Seed Rate	**Mid:** 0.4 kg / Ha	0.45 kg /Ha

6	Spacing	Mid: 60cm*60cm	20cm*25cm
7	Method of sowing	Seed bead is prepared and then transplanting	Transplanting
8	Fertilizers	Urea= 175 kg/ha; SSP= 375 kg/ha. MOP= 100 Kg/ha ; Borax= 8Kg/ha	Urea= 325 Kg/Ha; SSP= 375 Kg/Ha MOP= 40 Kg/Ha Note: 90% of farmers won't use Borax
9	FYM	10 tons /Hectare	5 tons /Hectare
10	Weeding	1st weeding 20days after transplanting 2nd weeding 40days after transplanting	2 times weeding & Earthing-up is done manually
11	Leaf eating insects	Malathion 50EC @ 1.5 ml / li of water (0.15%)	Profinofox+Cypermethrin Novaluron5.25%+Indoxicarp (Plethora™ ADAMA)
12	Cutworm, cricket, Red ant	Malathion 5% dust @ 20 kg / Ha	Soil application of Phorate or Furadon,10 – 15 kg/Ha Imidachloprid, for sucking pest
13	Black rot	Drenching of Agrimycin or Streptomycin (0.1 - 0.2g/li)	Zirum (Cumenel™Syngenta), Carandizium+Mancozeb(Saff)
14	Irrigation	Whenever required, Min of 5 irrigations.	Irrigated only in critical condition, Irrigation is a problem
15	Harvesting	When the curd obtains proper size.	When the curd obtains proper size.
16	Yield	15 – 17.5 Mt / Ha	17 Mt/Ha

Critical analysis of farmer practices vis-à-vis POP: Under-dosing and overdosing of fertilizers including micro nutrients. Seeds of new hybrid cole crops are available with private companies' retail points, are becoming popular among the farmers, but these varieties are not updated in PoP. To fetch better price in the market, early season crop is suggested. Communication on off season cultivation will be a part of demonstrations..

Solanaceous crops

Tomato

Sl.No	Practices	Recommended	Actual Practice by Farmers
1	Varieties	Punjab Chuhara,S-12, Punjab Kesri, Pusa Early dwarf, Sioux, Pusa Ruby,Arka Abha, BT-1,	Abhinav (Syngenta), Avinash, Pusa Kesari, Pusa Ruby, Arka Abha (BWR-1),
2	Land Selection	Well drained sandy loam. pH 5.5 and 6.5	Well drained sandy loam. pH 4.2 to 5.8
3	Field Preparation	Thorough ploughing to obtain deep fine tilth	5 times ploughing is done, 90% farmers use tractors & 10% farmers use bullocks.
4	Time of sowing	October to November	September to November
5	Seed Rate	0.5 Kg/ Ha	0.6Kg/Ha
6	Spacing	50cm*30cm (determinate type) 75cm*30cm (Indeterminate type)	60cm*30cm
7	Method of sowing	Seed bed is prepared and then seedling raising	Seed bed is prepared and then seedling raising
8	Fertilizers	Urea= 162 kg/ha ; SSP= 375 kg/ha. MOP= 100 Kg/ha ;	Urea= 375 Kg/Ha; SSP= 375 Kg/Ha MOP= 60 Kg/Ha *90% of farmers use plant regulators
9	FYM	10 tons /Hectare	5 tons /Hectare
10	Weeding	1st weeding 20days after transplanting 2nd weeding 40days after transplanting	2 times weeding is done manually
11	Leaf eating insects	Malathion 50EC @ 1.5 ml / li of water (0.15%)	Profenofos+Cypermethrin Novaluron5.25%+Indoxicarp (Plethora™ ADAMA)
12	Cutworm, cricket, Red ant	Malathion 5% dust @ 20 kg / Ha	Soil application of Phorate or Furadon,10 – 15 kg/Ha Imidachloprid, for sucking pests
13	Late Blight	Mancozeb75WP	CM-75 (Mancozeb+Carbendezim)
14	Bacterial Wilt	Asafoetida	Asafoetida and bactericides
15	Irrigation	1st irrigation immediately after transplanting Subsequent irrigation at 10-15 days interval depending upon soil condition.	Irrigated only in critical condition, *irrigation problem
16	Yield	35 – 40 Mt / Ha	22 Mt/Ha

Brinjal

Sl.No	Practices	Recommended	Actual Practice by Farmers

1	Varieties	Pusa Kranti, Pusa Purple Long, Pusa Purple Cluster, Pusa Purple Round, Punjab Vairab, Kuchia, BB-7, BWR-34, Pant Samrat, JC-1, JC-2.	US-45, US-618, Pusa Purple Round, Pusa Purple Long.
2	Land Selection	Well drained sandy loam and silt loam. pH 5.5 and 6.5	Well drained sandy loam. pH 4.2 to 5.8
3	Field Preparation	Thorough ploughing to obtain deep fine tilth	5 times ploughing is done, 90% farmers use tractors & 10% farmers use bullocks.
4	Time of sowing	September to October	September to October
5	Seed Rate	0.7-0.8 Kg/ Ha	0.8 Kg/ Ha
6	Spacing	75cm*60cm	60cm*60cm
7	Method of sowing	Seed bed is prepared and then seedling raising	Seed bed is prepared and then seedling raising
8	Fertilizers	Urea= 108 kg/ha ; SSP= 308 kg/ha. MOP= 84 Kg/ha ;	Urea= 350 Kg/Ha; SSP= 320 Kg/Ha MOP= 50 Kg/Ha
9	FYM	10 tons /Hectare	5 tons /Hectare
10	Weeding	1st weeding 20days after transplanting 2nd weeding 40days after transplanting	2 times weeding is done manually
11	Fruit & Shoot borer/ Nematode	Phorate or Carbofuran or Deltamethrin or Malathion 50EC.	Carbofuran Profenophos. Rogor/Alpha/Tarzan
12	Bacterial Wilt	Streptomycin/Asafoetida	Asafoetida and bactericides viz. Streptomycin/ Agrimucin
13	Irrigation	1st irrigation immediately after transplanting Subsequent irrigation at 10-15 days interval depending upon soil condition.	Irrigated only in critical condition, *irrigation problem
14	Yield	20 Mt / Ha	18 Mt/Ha

Critical analysis of farmer practices vis-à-vis POP: Under-dosing and overdosing of fertilizers including micro nutrients. Seeds of new hybrid Solanaceous crops are available with private companies' retail points, are becoming popular among the farmers, but these varieties are not updated in PoP. .

Cucurbits (Pumpkin)

Sl.No	Practices	Recommended	Actual Practice by Farmers
1	Varieties	Arka Suryamukhi, Arka Chandan, Selected local	Selected local, Arjuna and Arka Chandan of Chakra, Mahyco and Pahuja
2	Land Selection	Well drained sandy loam to moderately heavy soil rich in organic matter. pH 6.0 and 8.0	Well drained sandy loam to moderately heavy soil pH 5.0 to 6.5
3	Time of sowing	January – April (summer crop) September to October (spring Crop)	Feb – March (main crop – Summer) September – October
4	Seed Rate	6.0 – 8.0 Kg/ Ha	7 kg/ha
5	Spacing	2.5 -3.0 M*1.0M	2 M X 1 M
6	Fertilizers	Urea= 162 kg/ha ; SSP= 500 kg/ha. MOP= 136 Kg/ha ;	Urea= 140 Kg/Ha; SSP= 300 Kg/Ha MOP=120 Kg/Ha
7	FYM	20 tons /Hectare	5 tons /Hectare
8	Leaf eating insects	Malathion 50EC @ 1.5 ml / li of water (0.15%)	Profenofos+Cypermethrin Novaluron5.25%+Indoxicarp (Plethora™ ADAMA)
9	Cutworm, cricket, Red ant	Malathion 5% dust @ 20 kg / Ha	Rogor/Alpha/Tarzan/ Malathion
10	Powdery / Downymildew	Karathane WP or Kelthane	Karathanes
11	Irrigation	At 8-10 days interval during dry spell	Irrigated only in critical condition, *irrigation problem
12	Yield	12- 20 Mt / Ha	20 MT/ Ha

Critical analysis of farmer practices vis-à-vis POP: Under-dosing and overdosing of fertilizers including micro nutrients. Seeds of new hybrid Cucurbits are available with private companies' retail points, are becoming popular among the farmers, but these varieties are not updated in PoP. .

Cost of Cultivation and Marketing

Cost of Cultivation of Cole crops

Production items	Unit	Rate (Rs/Unit)	Quantity	Cost (Rs.)
Land Preparation	Ploughing- Levelling	1875	5	9375
Planting Material	Seed	20000	0.5	10000
Farm Yard Manure	MT	1000	2	2000
Urea	Kg	6	325	1950
Single Super Phosphate (SSP)	Kg	8.5	375	3187
Murate of Potash (MoP)	Kg	12	40	480
PP Chemicals	LS	LS	LS	1500
Crop booster/ Micronutrients	LS	LS	LS	1000
Irrigations	LS	LS	LS	2000
Labour requirements				
Nursery raising	Man days	300	8	2400
Transplanting	Man days	300	15	4500
Weeding	Man days	300	30	9000
FYM & Fertilizers Application	Man days	300	20	6000
Micronutrient/ booster application	Man days	300	10	3000
Irrigation	Man days	300	20	6000
Chemical application	Man days	300	10	3000
Harvesting	Man days	300	15	4500
Misc expenses				2000
Cost of Cultivation (CoC)/ha				**71892**
Production & Returns/ hectare	MT	8000	22	**176000**
Profit (returns-cost of cultivation)	Rs.			**104108**
BENEFIT TO COST(B:C) RATIO				**2.44:1**

Cost of Cultivation of Solanaceous Crops

Production items	Unit	Rate (Rs/Unit)	Quantity	Cost (Rs.)
Land Preparation	Ploughing- Levelling	1875	5	9375
Planting Material	Seed	26000	0.15	3900
Farm Yard Manure	MT	1000	2	2000
Urea	Kg	6	375	2250
Single Super Phosphate (SSP)	Kg	8.5	375	3187
Murate of Potash (MoP)	Kg	12	60	720
PP Chemicals	LS	LS	LS	3500
Crop booster/ Micronutrients	LS	LS	LS	1500
Irrigations	LS	LS	LS	2500
Labour requirements				0
Nursery raising	Man days	300	10	3000
Transplanting	Man days	300	20	6000
Weeding	Man days	300	30	9000
FYM & Fertilizers Application	Man days	300	20	6000
Micronutrient/ booster application	Man days	300	10	3000
Irrigation	Man days	300	30	9000
Chemical application	Man days	300	20	6000
Harvesting	Man days	300	20	6000
Misc expenses				6000
Total Cost of Cultivation (CoC)				**82932**
Production per hectare	MT	11000	22	**242000**
Profit (returns-cost of cultivation)	Rs.			**159068**
BENEFIT TO COST(B:C) RATIO				**2.91:1**

Cost of Cultivation of Cucurbits

Production items	Unit	Rate (Rs/Unit)	Quantity	Cost (Rs.)
Land Preparation	Ploughing - Leveling	1875	2	3750
Planting Material	Seed	5000	6.0	30000
Farm Yard Manure	MT	1000	2	2000
Urea	Kg	6	140	840
Single Super Phosphate (SSP)	Kg	8.5	300	2550
Murate of Potash (MoP)	Kg	12	120	1440
PP Chemicals	LS	LS	LS	1400
Crop booster/ Micronutrients	LS	LS	LS	1000
Irrigations	LS	LS	LS	1500
Labour requirements				0

Sowing	Man days	300	5	1500
Weeding	Man days	300	15	4500
FYM & Fertilizers Application	Man days	300	10	3000
Micronutrient/ booster application	Man days	300	6	1800
Irrigation	Man days	300	10	3000
Chemical application	Man days	300	10	3000
Harvesting	Man days	300	15	4500
Misc expenses				2000
Total Cost of Cultivation (CoC)				**67780**
Production per hectare	MT	8000	20	**160000**
Profit (returns-cost of cultivation)	Rs.			**92220**
BENEFIT TO COST(B:C) RATIO				**2.36:1**

Marketing

Marketing system remains almost same in most of the vegetables. Nearest markets are available within a distance of 5-10 kms. Vegetables are sold mostly in weekly markets/rural haats which operate usually once or twice a week. Transportation is done by means of *thela*, bullock cart, Auto carrier, Mini truck, Tata Ace, or in some cases Boats depending upon the vehicle and volume of quantity available. In the market auction doesn't happen rather one to one transactions take place.

Price Mark up in Cole crops (as an example):

S. No.	Value Chain Actor	Buying price (Rs./MT)	Selling Price (Rs./MT)	Gross Margin	Costs incurred (Rs./MT)	Net Margin	Share in Consumer's Rupee
1	Farmer	4732 (Cost of cultivation)	8000	3268	Costs incurred by farmer for marketing Loading=100 Transport=800 Market fee=50 Others= 50 **Total=1000**	2268	40.00%
2	Market trader Directly buys from farmers& sell in other markets	8000	14,000	6000	Costs incurred by trader (Selling in other market) Packing& Loading = 1000 Transport = 1500 Unloading =100 Weight loss = 400 **Total =3000**	3000	30.00%
3	Retailer*directly buy from farmer or buy from traders and sell. * Retailer's cost and margin remains the same in both case.	14,000	20000	6000	Loading & Transport= 500 Mandi fee = 30 Storage = 10 Other cost = 10 Post-Harvest loss = 950 **Total= 1500**	4500	30.00%
	Total	--	--	15268	5500	9768	100

Critical Constraints

In general, the following critical constraints have been observed in the vegetable value chains in APART clusters

1. Use of non descript variety seeds and lack of hybrid seeds in many of the clusters
2. Low standards of nursery raising in case of tomato, cabbage, cauliflower, brinjal leading to disease attack like damping off and issues related to nutrient deficiencies
3. Inadequate use of micro nutrients & limited use of organic manures and other organic inputs
4. Indiscriminate use of pesticides which is more harmful in case of vegetables, as they are consumed fresh and degradation time is not available.

5. Lack of staggered planting, resulting in harvesting at the same time, leading to market glut and low prices to the farmers
6. Poor PH management including handling, grading, packing etc. at farm level
7. Primitive methods of transport (gunny bags or bamboo baskets) leading to damages/bruises and hence lower price in the market
8. Lack of knowledge about maturity indices of vegetable crops
9. Improper stacking and overloading in trucks

Upgrading Strategies

SN	Critical constraint	Upgrading Strategy
1	Use of non descript variety seeds and lack of hybrid seeds in many of the clusters	Promising varieties /germplasm suitable for Assam conditions will be sourced from AVRDC, multiplied and introduced in APART Clusters through AAU
2	Low standards of nursery raising in case of tomato, cabbage, cauliflower, brinjal leading to disease attack like damping off and issues related to nutrient deficiencies	Farmer training and demonstrations on proper nursery raising and importance of micronutrients and secondary nutrients particularly *
3	Inadequate use of micro nutrients & limited use of organic manures and other organic inputs	
4	Indiscriminate use of pesticides which is more harmful in case of vegetables, as they are consumed fresh and degradation time is not available.	Information, Education and Communication (IEC) campaign on ill health effects of excessive pesticide usage on vegetables
5	Lack of staggered planting, resulting in harvesting at the same time, leading to market glut and low prices to the farmers	Farmer training and demonstrations on staggered planting of vegetables *
6	Poor PH management including handling, grading, packing etc at farm level	Organizing farmers into groups→ FPOs and establishing Common Service Centres (CSCs) in clusters
7	Primitive methods of transport (gunny bags or bamboo baskets) leading to damages/bruises and hence lower price in the market	Collapsible crated will be provided in CSCs for better handling and transportation of vegetables
8	Lack of knowledge about maturity indices of vegetable crops	Farmer training and demonstrations on maturity indices of vegetables*
9	Improper stacking and overloading in trucks	Training, proper awareness to CSC staff, truck drivers etc .

*All these aspects will be part of single farmer training/demo.

Action Plan

SN	Upgrading Strategy	Action Plan
1	Promising varieties /germplasm suitable for Assam conditions will be sourced from AVRDC, multiplied and introduced in APART Clusters through AAU	Detailed agreement would be signed with World Vegetable Centre on germplasm exchange, field trials etc. and introduction of elite planting material into the state. At the same time strengthening and capacity building of Directorate of Horticulture and Food Processing will be taken up in an intensive manner as it has been established in 2015 only. Seed production capacity of AAU will be augmented
2 &3	Farmer training and demonstrations on proper nursery raising and importance of micronutrients and secondary nutrients particularly *	Sufficient number of demonstrations in nursery raising particularly in solanaceous vegetables.
4	Information, Education and Communication (IEC) campaign on ill health effects of excessive pesticide usage on vegetables	IEC Campaign will be conducted in all vegetable clusters of APART. In addition consumer and trader awareness will also be strengthened regarding ill effects of excessive pesticide use on vegetable crops. Communication on Proper washing and boiling (wherever applicable) of vegetables before cooking will also be focused in the IEC campaign. Farmers will also be trained on proper dosage, making spray solution away from residential areas, children & animal dwellings, use of gloves and mask during spray, not spraying during windy and/or rainy days, taking bath after spraying, proper discarding of pesticide containers and never use them for storing food stuff, water carrier etc even for animals. During demos, allowing proper lag time for pesticides to degrade before harvest will also be focused.
5	Farmer training and demonstrations on staggered planting of vegetables *	Shifting dates of sowing and information on suitable early and late sown varieties will be a part of farmer trainings. It will also be ensure that these early/late sown varieties are then available at

SN	Upgrading Strategy	Action Plan
		the time of sowing. Low cost protected cultivation of vegetables during rainy season by farmers will be encouraged (support of World Veg will be sought on this).
6 & 7	Organizing farmers into groups→ FPOs and Common Service Centres (CSCs) in clusters for proper PH handling of vegetables to avoid PH losses Collapsible crated will be provided in CSCs for better handling and transportation of vegetables	Facilities for cleaning, washing, pre-cooling, crates, packing (wherever required) of vegetables will be provided in the clusters. Group marketing and institutional buyers will be explored for vegetable selling. Supply of fresh vegetables in residential colonies on twice a week basis will also be explored. This may work in bigger towns (clusters near Distt HQ) where most households have working couples.
8	Farmer training and demonstrations maturity indices of vegetables	Maturity indices charts will be distributed to farmers through CSC. These will also be explained and distributed during demonstrations and trainings to farmers

Value Chain Development Plan (VCDP) for Banana

Introduction

Banana (*Musa* sp.) is available throughout the year. To a large part of population, it offers affordability, varietal range, and taste, nutritive and medicinal value. These properties make it the favorite fruit among all classes of people. Assam is the one of the leading banana cultivating states in India with 51279 ha of area. Assam is the grower of unique Malbhog variety of banana which is sweetest among all banana varieties. The uniqueness of banana sector in Assam is its diverse characteristics i.e. varietal strength (numbering 15 to 20) which are either cultivated or partially domesticated or still in the wild form.

Major varieties of banana grown in Assam are Malbhog, Chenichampa, Amritsagar, Jahaji etc. Malbhog is a medium tall, most preferred indigenous table banana variety (AAB genomic group) of Assam that bears fruit in 18 months, yields about 8-9 kg per bunch and is prone to disease infestation and pest attack. Amritsagar is considered as the choicest variety of Assam. The plant is medium sized and delicate in nature. Fruit is long with a good taste, and the rind is medium thick. The bunch contains 80-100 fingers and weighs about 10 kg. Cheni Champa or Champa is one of the hardiest and tallest cultivar grown in Assam. It can be grown under rain-fed condition or with minimal irrigation. Its fruits are small and have a thin peel. The pulp is creamy in colour and its taste is sub-acid. The fruits turn golden yellow when ripe and keep well. The bunch contains 100-120 fingers and weighs about 8 kg. The plant is resistant to Fusarium wilt and fairly resistant to Bunchy top. Kacha Kola, also known as Anaji Kola, is the most commonly found plantain in the Assam. The fruit is rich in iron and the inflorescence has a good anti-diabetic effect.

Assam is the ninth largest state in terms of banana production in India as per National Horticulture Database 2014. The productivity of banana is very low in Assam i.e. around 17.69 t/ha compared to all India average of 37 t/ha. Highest productivity of banana is recorded in India in Madhya Pradesh (66 tones/ha) followed by Gujarat at 63.5 t/ha and Maharashtra 58.2 t/ha.

Area, Production and Productivity of Banana in select APART districts (2014-15)

Sl.	District	Area (ha)	Production (t)	Productivity (t/ha)
1	Darrang	1638	25066	15.30
2	Goalpara	3800	108121	28.45
3	Jorhat	2236	30856	13.80
4	Kamrup	3676	49869	13.57
5	Lakhimpur	2718	50663	18.64
6	Marigaon	1957	38710	19.78
7	Nagaon	3001	59448	19.81
8	Sivasagar	1454	29019	19.96
9	Sonitpur	3933	78612	19.99
10	**APART Distt.Total**	**24413**	**470364**	**Av=18.81**
11	Others	26866	436750	16.43
12	**State Total**	**51279**	**907114**	**Av=17.69**

Source: Directorate of Horticulture and Food Processing, Assam

Banana Clusters

Details of Banana clusters identified for project interventions is given in table-2 below

List of banana clusters identified for project interventions.

Sl.	District	Blocks/Clusters	Villages	Area of cluster (ha)	Production (MT)	Cluster productivity (MT/ha)
1	Darrang	Dalgaon-Salmari	Bilpar Nadir par No.3, Shyampur, Dhoronipur, Islampur (4)	163.33	2389.57	14.63
		Kalaigaon	Samala, Gargori, Jakua, Gariapara (2)	53.33	780.27	14.63
2	Goalpara	Rongjuli	Madang, Sidubi, Ambuk (3)	120	2338.32	19.49
3	Jorhat	UjaniMajuli	College Colony, Nayabazar, Ratanpur Miri, Anaichuk, Major Chapori&Petuajan, Bali, Molong, Panikhati,Kuhiarbari, Morisuti, Chaporigaon, Gopalpur, Gosain Bari, Mayongia, Mudoibill, Tokowbari, China Chapori, Silikhaguri, Abhayapuria, Bhakatiduar, Chiramdeori, Boikuntporia, lahon, JamudChuk, Fuloni, Polongoni, Jadabpur, Guwalbari, Jamuwa, Baraguri, Jorbil (30)	190.00	1425.00	7.50
4	Kamrup	Boko	Dekapara,Gamerimura (2)	53.33	581.44	10.90
		Chhaygoan	Bartari (1)	133.33	1938.13	14.54
5	Lakhimpur	Karunabari	Meneha, Reservegaon (1)	200.00	3289.00	16.45
6	Morigaon	Mayong	Amlighat,Daborghat,Sonaikuchi, Borkhal, Sindhisur, Kuthori (6)	133.33	2644.13	19.83
7	Nagaon	Laokhoa	Putakolong, Kathpara, Bhatiakhali, Muriputhikhaiti (4)	112.27	2006.65	17.87
		PaschimKaliabor	Khaloiaati, Halowagaon (2)	57.60	1029.54	17.87
		Raha	Majumgaon (1)	56.13	1003.33	17.88
		Batadrava	Kandhulimari (1)	110.80	1980.44	17.87
8	Sivsagar	Demow	Dehingmukh (1)	80	1310.80	16.39
		Kheluwa (Sivsagar)	AdabariHandique, Chtiahandiquepator, Santak 107 Grant, BormissingGaon, Karigaon, Santipur, SinghaduwarGohain (7)	82.85	1357.50	16.39
9	Sonitpur	Barsola	TintikaChapori, Rani Tapu, Gaitapu, Muslim Chapori, (5)	103	1845.95	17.92
	Total	**15 blocks**	**Total=70 villages**	**1458.98**	**24495.08**	**Av=15.72**

Banana Value Chain- Actors and Activities

Actors	Input Supplier	Producer (Farmer)	Aggregator	Trader	Wholesale buyer	Retailer	Consumer
Activities	Input supply	Production	Aggregation & temporary storage	Trading	Bulk buying	Retailing	Consumption
Support Services	Transport	Extension, Banking (KCC), Rentals	Credit (banking), Warehousing	Banking, Transport, Warehousing Packing	Banking, Transport, Packing , Warehousing	Transport, Temporary storage	--
Location	Input market	Farm	Farm- aggregation point	Wholesale Market		Retail market	Household

Adoption of Package of Practices

Practices	Recommendation	Farmer Practice
Variety/Cultivar	Jahaji (Dwarf Cavendish), Chenichampa, Malbhog, Bar Jahaji, Pura Kal (KachKal), Manohar, Jati, Bhimkal	Amritsagar (Semi dwarf)
Soil	Well drained, friable, loamy soil with adequate organic matter is ideal	Sandy loam
No. of plants per ha	Dwarf =3712 Semi dwarf = 2730 Tall =2092	3000
Planting	Pit (45 cm X 45 cm X 45 cm)	Pit (45 cm X 45 cm X 45 cm)
Treatment of planting material (suckers)	Carbofuran	Carbofuran
Land preparation	2-3 deep ploughings	2-3 deep ploughings
Spacing	Dwarf 1.8*1.8 m Dwarf 1.4 * 1.4 m (without ratooning) Semi dwarf 2.1*2.1m Tall 2.4*2.4 m	1.8*1.8 m
Planting time (month)	March-May	March-April
Planting material	Sword suckers, Tissue culture plants	Sword suckers
No. of irrigations	3/month during dry period	2-3 by (STW)
Irrigation method	Flood, drip cum fertigation	Flood
Manures and Fertilizers		
Farm Yard Manure (ton)	30-35 MT/Ha	12 MT/ha

Practices	Recommendation	Farmer Practice
Urea	0.65 MT Urea/ha	0.375 MT/ha
Di Ammonium Phosphate (DAP)	0.56 MT DAP/ha	1.125 MT/ha
Muriate of Potash (MOP)	1.4 MT MOP/ha	1.5 MT/ha
Single Super Phosphate (SSP)	0.3 MT/ha	1.5 MT/ha
Zinc Sulphate ($ZnSO_4$)	0.06 MT $ZnSO_4$/ha	Not applying
Borax	0.006 Kg B/plant or 0.12 MT Borax /ha	Not applying
Other Micronutrients	Cu=0.006 Kg/plant Or 0.018 MT/ha Mo=0.001 Kg/plant 0.003 MT/ha	Not applying
Plant Growth Regulators (PGRs)	No recommendation	Vipul Booster Multiplex
Plant Protection		
Pests Corm borer & Nematodes Psuedostem borer Leaf and fruit scarring beetle ***Diseases*** Bunchy top Panama wilt Sigatoka	Furadon3G @ 40 gm/sucker 0.1% Malathion 0.1% Malathion Dimethoate 1ml/l Carbendezim 0.05% Carbendezim 0.05%	Furadon 3G@ 40 gm/sucker 0.1% Malathion 0.1% Malathion Dimethoate 1ml/l No treatment No treatment
Cultural Operations		
Desuckering	Remove all suckers till shooting & allow only one sword sucker to set as ratoon crop	Done at 3,6,9 months
Weeding	Diuron 3 Kg/ha or Gramoxone 1.5 Kg/ha	Manual weeding
Bunch covering	With white polythene	Not done
Harvesting	When ridge changes from angular to round Dwarf=11-14 months Tall 14-16 months	10-12 months by the aggregator
Period of maximum harvesting	June-July	June-July
Yield	Tall : 15-20 MT/ha Dwarf : 30-40 MT/ha	17.69 t/ha (Assam) 18.81 t/ha (APART Districts) 15.72 t/ha (Clusters average)

Critical analysis of farmer practices vis-à-vis POP: Under-dosing and overdosing of fertilizers including micro nutrients. Since there is a problem of market glut in June July, staggered planting is suggested. Communication on staggered planting will be a part of demonstrations. To make available more banana during shortage periods of April (Bihu) and October (Durga Pooja), planting in Jan and July is recommended for Amritsagar (14-15 months crop) and planting in September and April for Malbhog (18 months crop). Production risks and production related issues-storm damage is major production risk, suggested remedies are given in chapter on strategies and action plan.

Availability of Inputs

Agrochemicals and fertilizers are available to the farmers from input suppliers located at block level while the sword suckers are available from fellow farmers. Each sucker costs around Rs. 3 to Rs. 4. Most of the heavy machinery, including power tillers and tractors, are used on hired basis. For land preparation around 20% farmers use power tiller while 80% farmers use tractor. Hardly any farmer goes for bullocks. Single ploughing per ha costs Rs. 1875. The prevailing rates of fertilizers, agrochemicals and other inputs available to the banana farmers are given below:

S. No.	Fertilizer/Agrochemical	Unit	Rate
1	Farm Yard Manure	Rs./MT	1000
2	Urea	Rs./ Kg	6
3	Single Super Phosphate (SSP)	Rs./ Kg	8.5
4	Muriate of Potash (MoP)	Rs./ Kg	12
5	Di Ammonium Phosphate (DAP)	Rs./ Kg	23
6	Furadon	Rs./ Kg	90
7	Rogor	Rs./liter	450
8	Malathion	Rs./ lit	80
9	Vipul Booster	Rs./ liter	400
10	Labour	Rs./Man-day	275-300
11	Suckers	Nos.	4
12	Irrigation water	Rs./irrigation	100

From discussions with the input supplier it was evident that he tries to push the product on which he gets better margins or gets attractive schemes by the company. Transportation charges for inputs from dealer shop to farm are paid by the farmer himself. The average ratio of cash to credit sales is from 60:40 to 70:30. Credit period is two-three months. Mostly small and marginal farmers buy in cash while progressive farmers avail credit. There are no issues with recovery of the credit by the input supplier. Default rates are almost nil.

Most of the input dealers in the banana production clusters are small time retailers and get their supplies from large distributors and not directly from the company except in case of IFFCO and KRIBHCO fertilizers which are supplied directly to cooperative societies. As a result some of the dealers have registered as cooperative societies to get the benefit of fertilizer supplies from IFFCO.

Most of the input dealers (around 75%) are involved in the field activities like field day, harvest day at farmers' fields. These are sponsored by private agri input companies. Maximum number of field activities is done in vegetable crops (brinjal, potato, water melon) for plant protection, micronutrients, seed hybrid etc. Majority of the agri input dealers maintain a data base of progressive farmers (around 50-60 farmers). Input dealers provide on shop crop advisory to the farmers for pest and disease management free of cost. This is an indirect way of pushing their products to the farmers.

Pesticides business offers the heaviest margins to the tune of 25-30%, followed by fertilizers and nutrient supplements @ 15-20%. Most of the fertilizers remain in short supply and black marketing is prevalent. The major constraint faced by agri input dealers is the lack of capital in expanding the business like scaling up the operations/volumes at the same place or opening an extension counter in another place. The scenario of banks offering credit to input dealers is not very promising. Banks are very reluctant and pose a number of procedural hurdles in financing the agri input dealers.

Cost of cultivation and marketing

Cost of Cultivation of Banana for 1 Ha. Area

Cost/Recn. items	Units	Quantity	Rate	Total in INR
Labour & tractorization				
Ploughing by tractor (land preparation)	Per Ha.	3	1875	5625
Pit digging and planting	DO	30	220	6600
Manure application	DO	20	220	4400
PP application		8	220	1760
Weeding	DO	70	220	15400
Harvesting	DO	50	220	11000
Irrigation(10 times in growing season)		10	220	2200
Total Labour		**238**		**46985**
Inputs				
Planting material	Nos.	2000	8	16000
FYM	Kg	1000	2	2000
Urea	Kg	375	6	2250
SSP	kg	1500	8.5	12750
Muriate of Potash	kg	375	12	4500
Micro Nutrient	LS			1000
Pesticide	LS			4000
Irrigation(water Charge)	LS			1000
Total Inputs				**43500**
TOTAL COSTS(INR)				**90485**
Productivity	15 MT/Ha.			
Sale Price	Rs. 28500 /MT			
Income from Production (INR)		**15**	**28500**	**427500**
Net Profit(INR)				**337015**

Few farmers take ratoon crop. In ratoon crop, cost of planting material, land preparation, pit digging and basin preparation is reduced. A brief on the cost of cultivation of ratoon crop is given below:

<u>Reduction in costs for ratoon crop</u>

a. Land preparation
(Levelling, plughing etc.) = Rs. 5625

b. Pit digging and basin preparation = Rs. 6600
c. Planting material = Rs. 16000
d. Total = **Rs. 28225**
e. Normal Crop cost of cultivation = **Rs. 90485**
Reduction in cost = Rs. 28225
Cost of cultivation for ratoon crop = Rs. 90485-Rs. 28225=Rs.62260
Productivity of Ratoon crop = 13 MT/Ha.

Marketing: Aggregation points are available within 5kms of production clusters. These are private facilities owned by aggregators and just serve as temporary storage .Harvesting is done mostly by the aggregator against 30% cash advance extended to the farmer two-three months before harvest. Each aggregator procures from 8-14 farmers. With respect to market and marketing channels, following observations were made for **Amritsagar** banana variety

S. No.	Paramater	Buying Price in Rs. /MT	Selling Price (Rs. /MT)	Gross Margin(Rs./MT)	Costs incurred (Rs./MT)	Net margin (Rs./MT)	Share in consumer rupee (%)
1	Farm gate price(Banana farmer)	6032	28500	22468	----------	22468	55
2	Sale price of aggregator	28500	34000	5500	Wrapping & loading=Rs. 200 Transportation=Rs. 275(Short distance)Unloading=Rs. 200 Storage= Rs. 25 **Total (app) =Rs. 700**	4800	12
3	Commission Agent in market	34000	37600	3600	Nil	3600	9
4	Sale price of wholesaler	37600	41700	4100	Loading =Rs. 200 Transport =Rs. 1500(long distance) Carbide treatment=Rs. 200 Covering =Rs. 200 **Total=2100**	2000	5
5	Sale price of retailer	41700	50000	8300	Unloading =Rs. 200 Wastage=Rs. 300 Transport=Rs. 100 **Total=600**	7700	19
6	**Total**	**----------**	**----------**	**43968**	**3400**	**40568**	**100**

It is evident that retailer earns the highest net margin and the share of farmer in consumer's rupee is highest. It was also informed that carbide treatment is heavily used for ripening of banana. It hastens the process of ripening drastically. Aggregators in general are not aware about the ethylene ripening. Natural ripening takes 4-5 days in summer while in winter it can take upto 20 days. Carbide can ripen within 1-2 days. April and October is high price season in the market because of a number of festivals. A large amount of banana also goes out of the state like Bihar, Nepal, Bhutan and West Bengal. Transportation costs to these places are higher.

Malbhog Variety:

S. No.	Paramater	Buying Price in Rs. /MT	Selling Price (Rs. /MT)	Gross Margin (Rs./MT)	Costs incurred (Rs./MT)	Net margin (Rs./MT)	Share in consumer rupee (%)
1	Farm gate price(Banana farmer)	7557	38850*	31293	----------	31293	63
2	Sale price of aggregator	38850	44400	5550	Wrapping & loading=Rs. 222 Transportation=Rs. 305 (Short km distance) Unloading=Rs. 222 Storage= Rs. 28 **Total) =777**	4773	10
2	Commission Agent in market	44400	49950	5550	Nil	5550	11
3	Sale price of wholesaler	49950	57720	7770	Loading =Rs. 333 Transport =Rs. 1500 (Long distance) Carbide treatment=Rs. 222 Covering =Rs. 222 **Total=2277**	5493	11
4	Sale price of retailer	57720	61050	3330	Unloading =Rs. 333 Wastage=Rs. 300 Transport=Rs. 100 **Total=733**	2597	5
5	**Total**	**--**		**53493**	**3787**	**49706**	**100**

Note: Retailer sells in hands, rest all value chain actors sell in bunches. One bunch considered equal to 10 hands in case of Malbhog and 8 hands in case of Amritsagar.

*It is evident that Malbhog variety fetches higher price and margins are also better.

Critical constraints in banana value chain

1. **Low productivity and propagation through traditional sword sucker method:** Average productivity of banana in the selected clusters is only 15 t/ha, which is far below the national average of 37 mt/ha. The major reason is cultivation through traditional method of sword suckers.
2. **Under dozing or over dozing of fertilizers and organic manures:** It is observed that throughout the state there is either under dozing or over dozing of fertilizers. For exampleurea is under dozed and MOP & DAP is over dozed. Quantity of organic manures applied is far less than the recommended doses. It reduces the soil organic matter.
3. **Storms and heavy rains during growing and fruit development stage:** Storms including hail damage the standing cropandbunches. The banana plant may topple over due to strong wind particularly in tall and semi tall varieties. Heavy rains during harvesting season lower the demand.
4. **Market glut is observed in the month of June- July:** Heavy quantities of banana arrive in the market during this period as this is also the peak harvesting season. Prices of banana go bottom low during this period of the year. However during the festival season, i.e. Bihu in April and Durga Pooja in October, the demand for banana is very high and the prices also shoot up.
5. **Poor Post Harvest Management**: No primary processing is done by the farmers. Bananas are brought to the market by farmers or aggregators as bare bunches which increases the possibility of damage. These are stacked one over the other in several layers in trucks after sale in wholesale market. The bananas in lower

layers get damaged due to weight of the bananas above. Crates (containing hands rather than bunches) are not seen in banana value chain of Assam.

6. **Carbide treatment of banana:** Banana is ripened artificially by wholesalers using Calcium Carbide (CaC_2) instead of ethylene. Carbide acts as a carcinogen and should not be used for fruit ripening as per Food Safety and Standards Authority of India (FSSAI). There is rampant use of carbide for ripening of banana as it is available cheap and is easy to use.
7. **Others:** *Market intelligence* network of the farmers is very weak. Input dealer and aggregator is the sole source of information for inputs and output respectively. However, banana traders get the information on prices in different markets through their business network and also through traders associations.

. Farmers get *credit* from the aggregator at the rate of around 30% advance, two-three months before harvest. This is generally interest free. The amount is deducted by the aggregator, at the time of purchase of banana. Exposure of the farmers to formal credit is low. Penetration of KCC is also very low. However, other value chain players have better exposure to financial services.

Upgrading Strategies

S. No.	Challenge/Issue	Upgrading Strategy
1	Low productivity and propagation through traditional sword sucker method	Tissue culture of desirable varieties. First the protocol will be developed by Assam Agricultural University. The University will produce and distribute the Tissue Culture Plants (TCPs) of desirable varieties, plus the technology may be licensed to private tissue culture labs. This will also encourage entrepreneurship on one side and availability of TCPs in all banana geographies will also increase. Apart from this hardening (primary and secondary) centres for TCPs offer another entrepreneurship opportunity. They will buy unhardened plants from banana tissue culture lab, harden them and sell to farmers.
2	Under-dozing and over dozing of fertilizers and organic manures	Demonstrations on recommended package of practices
3	Storms and heavy rains during growing and fruit development stage	Demonstrations will cover bunch covering and propping practices in banana. The project may provide technology for wind barrier to protect the crop from wind.
4	Market glut in June July & hence lower prices	Advocating staggered planting through demonstrations
5	Poor Post Harvest Management	Formation of FPOs and creation of Common Service Centres (CSCs) with primary processing facilities
6	Carbide treatment of banana	Massive IEC Campaign on ill effects of carbide & ethylene ripening chambers in select CSCs on pilot basis
7	Others: Lack of credit and poor market intelligence	a. Financial education and counseling, tie up with banks for cash agents, bank mitraetc*(covered in Comp C-3)* b. Market Intelligence Cell (MIC) will be set up at project level in *Comp C-2*

Action Plan

S. No.	Strategy	Activities to be done
1	Tissue culture for Malbhog&Amritsagar varieties.	Upgradation of the tissue culture lab at Assam Agricultural University (AAU) Development of tissue culture protocol for Malbhog and Amritsagar by AAU. Production and distribution of TCPs Hardening centres at three places in the state Total area to be covered = 1500 ha (app) TCPs required annually =1500*3000/2=22.5 lakhs (assuming plant population=3000/ha, replanting done every two years)
2, 3& 4	Demonstrations on recommended package of practices along with bunch covering & propping, staggered planting	In the 15 cluster identified, demonstrations of PoPs will be done. Recommended doses of fertilizers and agro chemicals will be focused along with bunch covering, propping& staggered planting. 5 demos/cluster/year Total demos=5 demos X15 clusters X7 years= 525 demos
5	Formation of FPOs and creation of Common Service Centres (CSCs) with primary processing facilities	One FPO/cluster i.e. 15 FPOs. Roughly 15 common Service Centres (for all agrihorti commodities). CSC covered area around 1500 sq ft.
6	IEC Campaign on ill effects of carbide	ATMA will be involved in anti carbide campaigns. These campaigns will cover aggregators, traders, consumers and will be carried out in all major towns of project districts
7	a. Financial education and counseling, tie up with banks for cash agents, bank mitraetc (covered in Comp C-3) b. Market Intelligence Cell (MIC) will be set up at project level in Comp C-2	Covered in respective components to avoid duplication
8	Exposure visits (domestic)	To National Research Centre(NRC) Banana, Trichy (Tamilnadu)
9	Exposure visits (foreign)	To leading Banana producing countries in South East Asia or Central America.

Note: Market development work (if any) in banana clusters will be done in Comp B-2
Road improvement work (if any) in banana clusters will be done in Comp B-2
Training and capacity building of ATMAs will be done on project basis & covered in C.1

Value Chain Development Plan (VCDP) for Potato

Introduction

Potato is the traditional vegetable in Assam. In Assam, potato is the 4th major crop grown in rabi season after vegetable, rice and mustard. Potato is considered as one of the most important vegetable in the state, where as it is also treated as source of carbohydrate. Potato (*Solanum tuberosum*) is grown on a significant scale in Assam and consumed by almost all the people. In flood prone areas under low land situation of North bank plains Zone, cropping system of Rice Fallow- Potato is followed.

Being vegetative propagated crop, numerous disease and pests attack the crop. Due to prevalence of diseases it is difficult to have a proper seed supply system; hence most of the disease free potato tubers are brought in each year from outside the states like Punjab, West Bengal.

Assam accounts for 5 % of the potato area of India, but the yield of potato is 1/3rd of national average. The growing season of potato ranges from October to March, but due to high humidity the occurrence of late blight creates a havoc affecting the crop yield.

Kufrijyoti is the single predominant variety, but of late due to market demand and early maturity K.pokhraj has become popular among the commercial farmers. Due to shortage of quality seed farmers of the state, use ware potatoes for seed purpose and all the seeds are affected by the virus and ultimately leads to low productivity.

K.jyoti is the variety with 100-120 duration having yield capacity of 150-160 qt/ha with tall erect plant characteristic and the tuber characteristic of this variety is oval shaped, flat, white skin, flat eyes, and the flesh are dull white.

In Assam potato grows in every district covering97956 ha of area but the productivity is only 8.18 Mt/ ha (Source Horticulture data base) , compared to 22.8 MT/ ha national average,where as the highest productivity in the country is 30.8 MT/ ha in Gujarat. Due to lack of cold storage facilities potatoes grown in the state meet the local demand for 4- 5 months and a sizable amount is transported to Arunachal Pradesh and other neighboring states.

Area, Production and Productivity of potato in selected APART districts (2013-14)

Sl.	District	Area (ha)	Production (t)	Productivity (t/ha)
1	Barpeta	8117	65353	8051
2	Cachar	2046	8094	3956
3	Darrang	5245	42977	8194
4	Golaghat	2263	15886	7020
5	Jorhat	1569	9871	6291
6	Kamrup	3824	29656	7755
7	KarbiAnglong	789	7619	9656
8	Kokrajhar	5904	71431	12099
9	Lakhimpur	10148	70412	6939
10	Marigaon	1355	7041	5196
11	Nagaon	5967	63312	10610
12	Nalbari	4300	27617	6423
13	Sivsagar	840	5133	6110
14	Sonitpur	7838	57143	7291
15	Dhubri	3799	39333	10353
16	Goalpara	1604	16141	10063
17	**APART Distt.Total**	**65608**	**537019**	**8.18**
18	Others	32348	163125	5.04
19	State Total	**97956**	**700144**	**7.14**

Source: Directorate of Horticulture and Food Processing, Assam

Potato Clusters

Sl	District	Blocks/Clusters	Villages	Area of cluster (ha)	Production (MT)	Cluster productivity (MT/ha)
1	Barpeta	Bhawanipur	Luwasur,DakhinBhalaguri, Bhalaguri, Bhogpur, PuranBhawanipur, Guwasa, Madhupur, NakuchariPather, DakhinHari,Pubhati(11)	500.00	4887.5	9.77
		Bajali	Saderi, ChotbarSaderi,BarSaderi, MonpurAnandapur, Bangaon, Bamunkuchi(6)	330.00	3225.75	9.77
		Chenga	RowmariGaon, RowmariPather, Garemari, Mazdia, Chatala, Khadia, Bamoni, Balatari, Chata, Batgaon, Matabari, ChengaKadamtola, Bohori, Samchen, NizBohori, Bohori Reserve, Kakadhowa, Ganakpata ,Sutapara, Bampara, Soretari, Barvitha, Maneri, Bechimari, Khoegra, Chenga Muslim Para, Haripar, Gelabil(26)	180.00	1759.5	9.77
		Chakchaka	Dahalopara, Bagulaman, Balapeta, DakhinVervery, Baregaon, Meda, NizDamaka, Keteki Bari, Balavita, Barpur(10)	225	2199.38	9.77
		Mandia	Balikhuti, Hasanpur, Rasulpur, Mahamadpur, Tarakauti, Chatala(6)	212.00	2072.30	9.77
		Pakabetbari	KurobahaPathar,Bamunbori,Nasatra, Fulbari,Gobandha,Basapara,BalaKhara,GarmurPather,Jalkara,Bamundi, Neulbandha,Barsimla,NizSaidah(13)	460.00	4496.50	9.77
2	Darrang	Dalgaon-Sialmari	Arimari No. 1,2,3,4, BadliBarali, Islampur, KheraniChapori, Shyampur(8)	160	1453.76	9.08
		Kalaigaon	Jugipara, Thekerabari 1,2,3, Panbari,Golondihabi, Kodamtala, GolondiChahBagisa(8)	293.33	2665	9.08
		Pachim Mangaldoi	Barthekerabari, Saruthekerabari, Garkhowapara, Bhalukkhowapara, Bhanguri Chuba, Dariapara, NizRangamati, Bangalpota, Sadau(9) Mara	180.00	1635.48	9.08
		Sipajhar	Burha, Sonarisal, Burhadoi, Balikuchi, Haidha, Titkuchi, Malibari, Padmajhar, Chakarmukh, Satara, SarabariBarampur, Hapara, Nagaon, Chakipara, DakhinKurua 1 & 2, BhatiKurua, PachimKurua,N.C. Kurua,Satkhali, Hatimua, Ruparikash, Dosotani, Chaladol, Rajapukhuri(25)	520.00	4724.74	9.08
3	Golaghat	BOKAKHAT (GOLGHAT WEST DEV. BLOCK)	Singabil, Kanfola, Upper Temera, Bhakatgaon, Misimiati, Namtemera, Medokgaon, Borchapori, Alamirazdiya, AlamiMajgaon, Alamilaklongiya, Maj Chapori, Nanomari, Rongagara(14)	374	2838.66	7.59
		DERGAON(NORTH DEV. BLOCK)	Balidua, Bilotia Koiborto,1 No. Joraguri, Danichapori, Siristika, DhemajiKoiborto, Bogorioni,1 No. Khokondoguri, Kosari Pam, Saguri, Chapori(11)	341.2	2589.70	7.59
		GOMARIGURI	Sonalipather, Gomari, Challangpather, Chaudangpather(4)	195	1480.05	7.59
		PADUMONI(EAST GOLAGHAT DEV. BLOCK	Dachamua, Borpather, Kalugaon, Kandulimari, Dhubaari, Lukhurakhoria,1 No.Sildubi, Garanibari, Dumjan, Mohpara, Jugalati, Porongonia, Goriagaon, Goroimari, Nepalikhuti,No. 1(15)	617.6	4687.58	7.59
4	Jorhat	DHEKORGORAH DEV. BLOCK(North West Jorhat)	Gandhali, GoriaChapori, Upper Namdeuri, Namgormur, Bukurs, Beloguri(6)	118	866.35	7.34
		MAJULI DEV. BLOCK	Jogi Koibotta, Bongaon, Pohardiya, Dhapak, Namkatoni, Dariya, KartikChapori, Jugunidhari, Mohkina, Bhakatchapori, Kerelagaon, , Birinabari, Bebayia, Malapindha, Chitader, Balichapori, Borgoya, Dhuasola, Buhakalita, Mekheligaon, Rowmora, Ghuria, Fakua, Ahatguri(25)	796.67	5849.13	7.34
		UJANI MAJULI DEV. BLOCK	BonoriyaChapori, Ratanpur, JorbilBoroguri, Gejera, Major Deuri, Morisuti, Mudoibil, JamnaaniGaon, Bhakatiduar, Borbi, Uluwani, Petnajan,BuliDeuri, Muwamari(14)	486.00	3568.21	7.34

Sl	District	Blocks/Clusters	Villages	Area of cluster (ha)	Production (MT)	Cluster productivity (MT/ha)
5	Kamrup	Hajo	Nijbongsor, Ambari, Singimari, Dadara, Bathon, Srihali, Sanpara, Bongsor, Ramdia, Bamundi, Kayatal, Haldia(12)	355	3894.52	10.97
6	KarbiAnglong	LANGSOMEPI	Hembonglong, Chapong, NatunBasti, Ram Teranggaon(4)	52.00	446.83	8.59
		RONGKHANG	Bithung, Nepali Gaon, Nepali Basti, KachariBasti(4)	51.33	441.11	8.59
7	Kokrajhar	Kokrajhar	Banderchara, Nayachera, Jhorna PT, Joregaon(4)	84.93	846.62	9.96
8	Lakhimpur	BIHPURIA	Marichapathar, Bagichagaon, Rajbari, Kangkur-Kaniajan, Dhunaguri, Bahgarh, Dhulimuli, Gosaichuk, Mornoi-Jhengal, Bodoti, Jamuguri, Dahgharia(12)	264.67	4122	16.71
		BOGINADI	Bokanola(1 &2), DighaNaharbari, Bhagabil,HinduMajgaon, Monipara, Jaradhara, KakoiRajgarh, Na Ali, Majgaon, Kadam Laimekuri, BadhakaraBaligaon, Kasikata, Jorhatia, Tadang, BhangabilSarania, Hakarajan, Ghagarnagar, Padumoni, Bokulbari, Hechamara, Bhurbandha, Dorge, Goroimari, Jorhatia, Kathalguri, Thekeraguri(28)	556.67	8820.00	15.84
		KARUNABARI	Bango-Dongibil-6568 No. Grant, Sonarigaon-Luidonga, Sandakhowa-LikhokSapori, Adi-Alengi-Khurasapori, Bongaimora-Bongalmora Grazing, Merbil, Lakhnabari-Maneha, ManehaSapori,BogoriPathar(9)	172.80	2592.00	15.00
		NAOBOICHA	Deobil, Pokonia, Salmora, Kowoibhoroka, RoudangPathar, Naharrani, Betbari, Rangpuria, Dhemagar, Hatimora, Chagarpur, Charani, Hadhabpur, Nigarpar, Gupalpur(15)	326.40	4896.00	15.00
		TELAHI	Azarguri, Tiokia, PachimKharkati, Pokadol, Kharkati, Major Chapori, Chengamari, GohainTekela, TelahiBantow, Amguri, Teliapathar, Baligaon, Nagagaon, Asarokota, Gamchuk, Pathorichuk, Dambukial(17)	366.67	5735.00	15.64
9	Morigaon	BHURBANDHA	Koraiguri, Jurgaon, Domal, Meruagaon, Morakolong, Tengaguri, Hekenamara, Mori Muslimgaon, Dandua, Mazgaon, Haldhibari, Doloichuba, Sapmari, Kowarbori, Naokata, Borongabari, Bhurbandha, Bogoribari, Kahibari, Patidiya, Sorboringam, Kumuraguri, Veluaati, Lotimari, Ouguri, Moranguri, Hahchora.(27)	216	1090.15	5.04
		MAYONG	Hatimuri, Kasochila, 1 No. Murkata, Borpaam,2 No. Murkata, Bordia, Silduba, Rajamayong, Kalkhilapaar, Loonmati, Ouguri, Khutibheti, Kachubori, Kusumpur, Soontuli, Gogolmariashigarh, Ashigarh, Beradia, Chutugarjan, Nandinibori, Bamunjari, Goroimari, Boramarigaon, Boramaripaam, Gorokhiadhaap, Pabhokati, PabhokatiDhhalijan, Bonomori, Morisutipam. Patekiburi, Hatibhangi, Teteliguri, Katohguri(34)	371	1872.43	5.04
		MOIRABARI	Hatimuria, Moirabari, Tatikata, Vellouueguri, Leruarmukh,Bor-Chapori, Goroimari, Borthal, Doloigaon, BorthalKacharigaon,Bhojakhaity(11)	175	883.22	5.04
10	Nagaon	BATADRAVA	Kandhulimari No.1, Kandhulimari No. 2, Bilatia, Soonsiri, Sologuri, Rajabari, Khariamari(7)	484.87	3027.50	6.24
		JURIA	ChitalmariBeel, ChitalmariPather, DhinboriChapori, DhinboriPather, Sutipar, Singari, Baralimari, Chenimari(8)	529	4765.59	9.00
		KALIABOR	Dolapani, Deorichilabandha, Hatibandha, Gakhirkhati, Dolibari, Hatimua, Silghat(7)	314.00	2828.72	9.00
		LAOKHOWA	Ambagan, Tubkijaroni, Putakolong, Lorimukh, Lailuri, Bhurbandha, Laokhowa, Kathpara, Bhatiakhali(9)	289.33	2606.51	9.00
		PACHIM	Panigaon, Halowagaon, Missamukh,	185.00	1666.60	9.08

Sl	District	Blocks/Clusters	Villages	Area of cluster (ha)	Production (MT)	Cluster productivity (MT/ha)
		KALIABOR	Khaloiaati, Missamukhpam, Sibastan, Lakhanabandha, Baridhuwa(9)			
11	Nalbari	Barkhetri	Loharkatha, Golddighla, Bespara, Adabari, Bortola, Joysagar, Mukalmuwa, Narayanpur, Balikuchi, Darangipara, Dagapara, Lawtola(12)	796.67	5166.38	6.48
12	Sivasagar	Gaurisagar	Chirakhunda, Ghurachua, Bogidol, Magarahat, Bhati Bon gaon, Hatighuli, DikhowmukhGualgaon, Raghubari, Charing(9)	390.00	1799.59	4.61
		KHELUWA(SIVA SAGAR)	SinghaduarGohain, SoonpuraKoiriBasti, BetbariMithapukhuri,BarpatraGohain, Kathpara, Bahoiting, LepaiSumoni, Karigaon(9)	166.67	769.06	4.61
13	Sonitpur	BAGHMORA	Pub Gingia (a), PachimGingia (b), 1No. Poliumoni, RatowaPather, Ratowa, MonabariBasti (a), MonabariBasti (b), MonabariBasti ©, Guti Bari, SuniniBari,Birijan, Mizika, Ghoramari, Jangalbasti(14)	1089.33	7749.52	7.12
		Bihaguri	Nam Pithakhowa, JakaruwaChuburi, Likhakgaon, Tumuki, Bhalukekhowa, Kamarchuburi, Bordubia, JengarChuburi, Jaroni,Niz-Bihaguri, Kokalbhagi, Teliagaon(11)	556.00	3955.38	7.12
		DHEKIAJULI	Borbill, Ratnapur, DighalDol, 1 No. Dhaumara, Rowmari, Laobari, Balisuti, Gabharupam(8)	723.33	5145.79	7.12
		GABHARU	Kalibarichuk, Bhojkhowa, Bhomoraguri, 4 No. Sirowani, 1 No. Sirowani, Rajbharal, Jorgarh(7)	578.13	4112.84	7.12
		SOOTEA	Palhekakari, Bhouwaguri, Dikariguri, Bhuyapara(4)	652.53	4642.12	7.12
	Total	**42 blocks**	**502 Villages**	**15736.13**	**134875.10**	**8.57**

Potato Value Chain- Actors and Activities

Actors	Seed Growers	Input Supplier	Producer (Farmer)	Aggregator	Trader	Wholesale buyer	Retailer	Consumer
Activities	Seed tuber production	Input supply	Production	Aggregation, temporary storage & Cold storage	Trading	Bulk buying	Retailing	Consumption
Support Services	Storage	Transport	Extension, Banking (KCC), Rentals	Credit (banking), Cold storage	Banking, Transport, Bagging & Packing	Banking, Transport, Packing , Storage in Cold Store	Transport, Temporary storage	--
Location	Outside state (Punjab / UP/ W Bengal)	Input market	Farm	Farm gate aggregation	Wholesale Market		Retail market	Household

Adoption of Package of Practices of Potato

Practices	Recommendation	Farmer Practice
Variety/Cultivar	Kufrijyoti, Kufrichandramukhi, Kufrisindhuri, Kpokhraj	**Nainital, Bengal potato, Jalandhar , KurfiJyoti, K pokhrajand Local Assam Potato**
Soil	Well drained, sandy loam and loam soilrich in organic matter are suitable.	Sandy loam
Field Preparation	**2-3 times thorough ploughing to fine tiith**	**Land preparation by Tractor / Power tillers (50%) and bullocks (50%).**
Time of sowing/ Planing	Mid October-Mid November	Mid October- November
Seed Treatment	Treatment with Mancozeb	Treatment with Mancozeb
Spacing	20 cmX 15 cm	15 cm X 15 cm
Sowing method	Sprouted tuber having 3-4 eyes	Sprouted tuber
Fertilizers	**Urea= 133kg/ha** **SSP= 312kg/ha** **MOP= 83kg/ha**	Over dose as well as under dose
FYM	5 MT	2 MT
Intercultural operation	2-3 earth filling & weeding	2-3 earthfilling along with weeding
Disease Management		
Late Blight of potato	2 alternate spray of Mancozab&ridomil (Mancozab + Metalaxyl)	2-3 spray of mancozab
Irrigation	2-3 furrow irrigation	1-2 flood irrigation
Cost of cultivation (Rs / ha)	Scale of finance	Rs 1,10,000.00
Yield	150-160 qt/ha	81.8qt/ ha

Critical analysis of farmer practices vis-à-vis POP: Non use of the recommended variety and quality seed due to lack of availability. Under-dosing and overdosing of fertilizers including micro nutrients. As the climatic condition is not suitable for seed production of potato, hence, it is suggested to introduce certified seed from states like Punjab and multiplication for at least one generation. Demonstration of new varieties including process variety like K. Chipsona, Atlanta is to be taken up to meet the demand of processed potato locally. Late Blight of potato being the major problem it is suggested to have strong awareness to protect the crop.

Availability and Access to Inputs

Seed: Potato seed tubers are brought by the traders from outside the state based upon the demand. Of late, farmers of Gingia have undertaken seed production programme and 20 % seed demand has been met up locally.**The seed requirement of potato is 2.2- 2.3 MT/ha.** Most farmers buy potato seed tubers from the market which are brought from outside the state. There is 80% shortage of certified potato seed tuber of recommended varieties. Farmers prefer potato seeds of Punjab origin, but due to non availability of quality seed in time, they have to use the varieties available in the local market. Government of Assam popularizing varieties like K pokhraj, K Khyati etc. but still a proper seed supply system is to be developed. In some cluster like Gingia in Sonitpur, Mandia in Barpeta farmers have under taken non official seed production plan and 2-3 % self saved seeds are used.

Agro Chemicals: Agrochemicals and fertilizers are locally available to the farmers from input dealers. Among the agrochemicals major one is Mancozeb, Metalexil, Phorate which are heavily used for the control of late blight of potato and some of the soil pest like red ant. Due to prevalence of various pests like aphids and jassids and also to control the white fly which is the transmitting agent for Potato Leaf Roll Virus (PLRV) farmers use different chemicals in over doses. . Among the fungicides Carbendezim is mostly used for seed treatment.

Fertilizers: Fertilizers are in short supply and are sold above MRP. Under dosing as well as over dosing of fertilizers is prevalent among the cluster farmers. Fertilizers are available from agri input dealer or cooperative depots. Transportation costs are paid by the farmer.

In the Gingia cluster of Sonitpur **Urea= 190kg/ha, SSP= 375Kg/ha, MOP= 100 kg/ha is being used.** These quantities are above the proscribed doses as per recommended Package of Practices (PoP).

Liming is done at 3 years interval.
Shortages of labour are a big problem and for hiring labour farmers are to pay labor chargesRs. 220.00/ day.

Soil preparation: For land preparation around 50% farmers use power tiller/ tractor and another 50 % use bullocks. The prevailing rates of fertilizers, agrochemicals and other inputs available to the farmers are given below:

Sl.	Fertilizer/Agrochemical	Unit	Rate
1	Farm Yard Manure	Rs./MT	1000
2	Urea	Rs./ Kg	6
3	Single Super Phosphate (SSP)	Rs./ Kg	8.5
4	Muriate of Potash (MoP)	Rs./ Kg	12
5	Di Ammonium Phosphate (DAP)	Rs./ Kg	23
6	Furadon	Rs./ Kg	90
7	Rogor	Rs./liter	450
8	Malathion	Rs./ Kg	80
9	Mancozab	Rs/ kg	700
10	Metalaxin	Rs/ kg	1000
11	Zinc Sulphate	Rs./ liter	400
12	Labour	Rs./Man-day	300
13	Seed tuber	Rs / MT	30,000
14	Irrigation water	Rs./irrigation	100

Transportation charges for inputs from dealer shop to farm are paid by the farmer himself. The average ratio of cash to credit sales is from 60:40 to 70:30. Credit period is two-three months. Mostly small and marginal farmers buy in cash while progressive farmers avail credit. There are no issues with recovery of the credit by the input supplier. Default rates are almost nil.

Most of the input dealers (around 75%) are involved in the field activities like field day, harvest day at farmers' fields. These are sponsored by private agri input companies. Maximum number of field activities isdone for plant protection, micronutrients, etc. Majority of the agri input dealers maintain a data base of progressive farmers (around 50-60 farmers). Input dealers provide on shop crop advisory to the farmers for disease management free of cost. This is an indirect way of pushing their products to the farmers.

Agro-chemical and seed business offers the heaviest margins to the tune of 25-30%, followed by fertilizers and nutrient supplements @ 15-20%. Most of the fertilizers remain in short supply and black marketing is prevalent. The major constraint faced by agri input dealers is the lack of capital in expanding the business like scaling up the operations/volumes at the same place or opening an extension counter in another place. The scenario of banks offering credit to input dealers is not very promising. Banks are very reluctant and pose a number of procedural hurdles in financing the agri. input dealers.

Cost of cultivation and marketing
Cost of Cultivation of Potato

Sl. No.	PRODUCTION ITEMS	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1	Seeds	Qtls.	2250	30.00	67500.00
2	FYM or Compost	Kg.	5000	1.00	5000.00
3	Urea	Kg.	142	6	852.00
4	SSP	Kg.	337	8.5	2864.5
5	MOP	Kg.	90	12	1080

Sl. No.	PRODUCTION ITEMS	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
6	Land Preparation			LS	3000.00
7	PP Chemicals			LS	1500.00
8	Irrigation			LS	1000.00
9	Wages	Nos.	65	220.00	14300.00
10	Misc			LS	1500.00
	Total =				**98596.5**
	Say =				**98600.00**

Productivity in potato clusters= 16.71 MT/ha
Per tonne cost of cultivation =98600/ 16.71=Rs.5900/ MT
Average sale price= Rs. 8000/MT
Gross savings=8000-5900=Rs. 2100/MT
Post harvest expenditure by farmer= Rs. 351/MT
Net savings to the farmer= Rs. 1749/ MT

Marketing

Farm gate aggregation points are available at the production clusters. These facilities owned by aggregators and just serve as temporary storage. Harvesting is done manually by the farmers. Aggregator collects potatoes from the adjacent farmers. Farmers immediately sale their produce to the aggregators. 20 % farmers store potatoes after harvest for max 1.5- 2 months till on set of monsoon. Storing of potatoes after harvest for 1.5-2 months leads to an increase of farm gate sale price to Rs12, 000/ MT from Rs 8000.00 per MT. Regarding market and marketing channels, following observations were made.

S. No.	Parameter	Buying price (MT)	Selling price (MT)	Gross Margin (selling-buying)	Cost incurred/ MT	Net margin	Share in consumer Rupee
1	Farm gate price of potato	5900 (CoC)	8000	8000-5900= 2100	Loading=15 Transport=320 Unloading =15 Market fee=1 **Total=351**	1749	54.42%
2	Sale price of aggregator	8000	10000	2000	Loading=15 Unloading =15 Paid to Commission Agent=15 **Total =45**	1955	13.60%
3	Sale price of retailer	10000	14700	4700	Loading =15 Transport= 60 Mandi fee= 1 Storage= 2 Commission Agent=30 **Total= 108**	4592	31.97%
	Total			**6700**	**504**		**100**

It is observed that highest net margin earn by the retailer and the share of farmer in consumer's rupee is highest. It was also observed that cold storage is hardly used by the farmers or the aggregators for long term storage of potato. Aggregators are aware of importance of cold storage of potatoes, but due non availability as well as shortage of electricity, they prefer to sell after short duration storage. Price of potatoes start to increase after May-June and the price is highest in October which become upto Rs. 22000.00-25000.00 / MT. Though there is local production, potatoes come from outside the state round the year. A small part comes from Meghalaya during the summer season.

Critical constraints in Potato value chain

1. **Low productivity and Use of non seed for seed purpose:** Average productivity of potatoes in Assam is 8.18 /ha while the productivity in selected clusters is Max of 16.71 MT /ha, which is below the national average of 22.8 MT/ha. The major reason of low productivity of potatoes in Assam due to shortage of quality seed, where as in the selected cluster farmers' use either imported seed from Northern India or their own saved

generation 1 seed. Acceptance of new potato varieties like K. Pukhraj has increased the productivity of potatoes dramatically. .

2. **Under dozing or over dozing of fertilizers and other Agril chemicals:** It is observed that throughout the state there is either under dozing or over dozing of fertilizers. Over dosing of fertilizers observed in the clusters where as under dosing in terms of non balanced fertilizing is practiced in other places. Quantity of organic manures applied is far less than the recommended doses. Pvt Agro-chemical companies play a major role in overdosing of chemicals.
3. **Non use of Irrigation**: Except in selected clusters, farmers are reluctant to apply irrigation water in potato field and it is presumed that application of irrigation will lead to late blight of potatoes. However, farmers in the clusters use 2-3 furrow irrigation due to which the productivity is almost at par with national average**.**
4. **Un seasonal rainfall:** Due to shorter winter period cultivation of potatoes are to cope up with the growing environment of potatoes in the state. Mid October to February is the suitable period for potato cultivation, but due to heavy rains during post monsoon ie in last part of October entire planting season is delayed. In selected cluster few farmers practice double cropping of potatoes. In such condition the first crop is harvested before proper maturity, in the month of December and plant a second sort duration crop. In such condition the yield loss is compensated with the higher market price before peak harvesting.
5. **Poor Post Harvest Management**: No mechanized grading is followed. However, farmers practice field grading and curing in the field itself. Potatoes are purchased by the aggregators at field itself and in some cases farmers store for a very short period after harvest.
6. **Storage:** Farmers can store for 1-2 months without storing in the cold storage. In Gingia cluster, farmers store the seed potatoes for the next year and sale the table potatoes to the traders, who transport the produces either to Cold storage or neighboring states like Arunachal Pradesh.
7. **Credit**: Exposure of the farmers to formal credit is low. Penetration of KCC is also very low. To protect the interest of the potato farmers, the crop insurance scheme is to link up with the credit.

Upgrading Strategies

S. No.	Challenge/Issue	Upgrading Strategy
1	Low productivity and Use of non certified seed tuber.	Strengthening of informal seed production programme. Introduction of certified stage-I potatoes from Punjab and its multiplication for at least one-two generation and use for seed purpose. As the rate of degeneration is very high, hence seed production should be restricted to 2 generation only. Seed production is advised in clusters having facilities of cold-storage. Varieties like K Khyati, K Pokhraj to be popularized. Processed potato variety like K. Chipsona to be introduced to meet the demand of chips industry. Potato seed village programme in selected cluster to be encouraged.
2	Under-dozing and over dozing of fertilizers and organic manures	Demonstrations on recommended package of practices. It will also be demonstrated to apply nutrients through different methods.
3		
4	Low prices at time of harvest	Advocating harvesting at maturity and storing in locally for 2-3 months after harvest.
5	Poor Post Harvest Management	Formation of FPOs and creation of Common Service Centres (CSCs) for grading, sorting, packaging.
6	Treating of potatoes with chemicals	Recommended sprout inhibitors like CICP is to be advocated to minimize PHL.
7	Others: Lack of credit and poor market intelligence	Financial education and counseling, tie up with banks for cash agents, bank mitra etc. Market Intelligence Cell (MIC) will be set up at project level in *Comp C-2*

Action Plan

S. No.	Strategy	Activities to be done
1	Strengthening of informal seed production programme.	Introduction of certified stage-I potatoes from Punjab and its multiplication for at least one-two generation and use for seed purpose. As the rate of degeneration is very high, hence seed production should be restricted to 2 generation only. Seed production is advised in clusters having facilities of cold-storage. Varieties like K Khyati, K Pokhraj to be popularized. Processed potato variety like K Chipsona to be introduced to meet the demand of chips industry. Potato seed village programme in selected cluster to be encouraged.
2	Demonstrations on recommended package of practices.	In identified clusters, demonstrations of PoPs will be done. Recommended doses of fertilizers and agro chemicals will be focused along with method of application of fertilizers
3		
4	Advocating harvesting at maturity and storing in locally for 2-3 months after harvest.	ATMA will be involved in transmitting the PHM techniques.
5	Formation of FPOs and creation of Common Service Centres (CSCs) for grading, sorting, packaging.	FPO will be formed in 41 selected cluster
6	Recommended sprout inhibitors like ICCP is to be advocated to minimize PHL.	For PHM Central Potato Research Institute SIMLA will be contacted
7	Financial education and counseling	Tie up with banks for cash agents, bank mitra etc. Market Intelligence Cell (MIC) will be set up.

Value Chain Development Plan (VCDP) for Ginger (*Zingiberofficinale* L.)

India produces 2.75 lakh MT of ginger per annum, almost a third of the world's production of 8.35 lakh MT. Assam alone contributes 1.14 lakh MT or 41% of the country's total production. Commonly cultivated varieties in Assam: Rio-de-Geneiro, Nadia, Karkai, Bardwan, Moran, Jorhat and China. Karbi Anglong district of Assam is the hub for organic ginger cultivation, accounting for more than half of the Northeast's produce, but lack of awareness and marketing facilities has resulted in hardship for nearly 2,000 families involved in the trade.

Value Chain Strategy: Strengthening the varietal specific terminal market linkages of Assam Ginger for leveraging quality specific pricing modality while facilitating value addition at source supported by a well integrated logistic network

Value Chain Development Plan:

- **a.** Mapping the entire production base line of Assam Ginger, with special focus on varietal attributes, growers preference, market requirement, agro-climatic suitability and establish the market linked product specifications for each variety/grade.
- **b.** Strengthening the terminal market linkages of Assam Ginger in its fresh form on a varietal specific market segregation approach for leveraging the product value, volume and price realization of all stakeholders
- **c.** Promoting entrepreneurs for primary value addition focused on market driven product specifications with strong logistic network targeting product value enhancement, cost reduction and increased returns to the primary producer

Area, Production and Productivity of Ginger in Assam (2014-15)

Sl.	District	Area (Ha)	Av. Yield (Kg/Ha)	Production (MT)
1	Dima Hasao	3970	7780	30887
2	Karbi Anglong	2442	7375	18010
3	Golaghat	1171	8968	10502
4	Udalguri	774	9870	7639
5	Tinsukia	768	7880	6052
6	Sonitpur	737	7590	5593
7	Barpeta	687	7655	5259
8	Nagaon	486	9975	4848
9	Baksa	600	7995	4797

Sl.	District	Area (Ha)	Av. Yield (Kg/Ha)	Production (MT)
10	Dhemaji	500	8770	4386
11	Lakhimpur	467	7798	3641
12	Goalpara	476	7375	3511
13	Darrang	400	7750	3100
14	Kamrup (R)	368	7670	2823
15	Morigaon	304	8978	2729
16	Kokrajhar	360	7565	2724
17	Jorhat	248	7865	1951
18	Chirang	371	5025	1864
19	Nalbari	230	7980	1835
20	Cachar	239	6995	1672
21	Sivasagar	191	7685	1469
22	Hailakandi	210	6120	1285
23	Dibrugarh	160	7845	1255
24	Kamrup (M)	125	9970	1246
25	Karimganj	151	7685	1160
26	Bongaigaon	178	6486	1155
27	Dhubri	105	8680	912
TOTAL		**16718**	**7901**	**4900**

Source: Directorate of Horticulture and Food Processing, Assam

Prominent Ginger Growing Clusters

Prominent ginger growing clusters in Karbi-Anglong district of Assam.				
Cluster villages	TaralangsoSartheKilling, SartekillingLangmili, DhonsingLangmili	Ransingchanse, Mansingingti, Buraterang, Sadhukhuti, Diliramterang, Pathor, Kramsabasti.	Tuethang, Jollen, Gangjang, Jollenbung	Zirkingding, Kanrongbey, Rongchinjeng, Tongchili, Chijinglangso, Rongnilhang.
Area (Ha)	33	75	40	270
Block	Diphu	Longcholiet	Manza	Socheng
Cluster Name	Bakhmari	Mansingingti	Singasan hills	Zirkingding

Source: Directorate of Horticulture and Food Processing, Assam

Identified Ginger Clusters Under APART

Sl.	District	Block/Cluster	Villages	Area (ha)	Production (t)	Productivity (t/ha)
1	K. Anglong	Lumbajong	Singhason Belt(1)	1500	16020	10.68
2	Golaghat	Kakodonga	Domjoria,Majukuchi(2)	326.67	2930.20	8.96
3	Lakhimpur	Karunabari	Bishnupur,Dhekiajuli,Meraguri,Oauhat(4)	400.00	3124.80	7.81
4	Sonitpur	Balipara	Chafrangguri,Batasipur,Allenbari,Laodanggri,Sujung,Balijuri,Akrampur,Balisuti,Natunbasti,Ashur Mari,Dimiyapur(12)	130	1261.65	9.70
		Dhekiajuli	Gormora,Malorgaon,Borghuli,Kamarigaon,Dharikati,Sengelimari,Sotai,Bhalukpung,Sonaimiri(9)	50.53	490.43	9.70
	Total	**5 Blocks**	**28 Villages**	**2408**	**23827**	**8.71**

Source: District Agriculture office of respective district

GINGER VALUE CHAIN: ACTORS AND ACTIVITIES

Actors	Input Supplier	Producer (Farmer)	Aggregator	Trader	Wholesale buyer	Retailer	Consumer
Activities	Input supply	Production	Aggregation & temporary storage	Trading	Bulk buying	Retailing	Consumption
Support Services	Transport	Extension, Banking (KCC), Rentals	Credit (banking), Warehousing	Banking, Transport, Warehousing Packing	Banking, Transport, Packing , Warehousing	Transport, Temporary storage	--
Location	Input market	Farm	Farm-aggregation point	Wholesale Market		Retail market	Household

PACKAGE OF PRACTICES:

Sl.	Practices	Recommended (Government)	Actual Practice by Farmers
1	Varieties	Rio-de-Generio, Nadia, Karkai, Bardwan, Moran, Jorhat, China.	Aizwal, Nadia, Karbi-Ginger, Local cultivars.

Sl.	Practices	Recommended (Government)	Actual Practice by Farmers
2	Land Selection	Well drained medium loam	Well drained medium loam
3	Field Preparation	No	Land preparation by bullocks (100%) In valleys farmers just adjust soil through hand spaw.
4	Time of sowing	March to April	Feb to April
5	Seed Treatment	Mancozeb 75 WP (2g/l)	Seed treated with Mancozeb (practiced only by progressive farmers).
6	Seed Rate (MT/Ha)	1 to 1.5 MT/Ha	1.2 to 1.5 MT/Ha
7	Spacing	25cm * 15* 10cm (Row to row * plant to plant)	25cm*15*10cm (Row to row * plant to plant).
8	Method of sowing	Pit sowing	Pit sowing
9	Fertilizers	Urea = 20kg/Ha. Phosphorous = 60kg/Ha. Potassium = 20kg/Ha.	Not Practiced.
10	FYM	3 Tons/Hectare	2.5 tons /Hectare
11	Weeding	1st @ 40 days after planting (before second mulching) and to be repeated depending upon intensity of weed growth.	1st @ 45 days after planting (before second mulching) and to be repeated depending upon intensity of weed growth.
12	Insect Pests		
A.	Shoot borer and leaf borer	Dimethoate	Chlorpyriphos (practiced only by progressive farmers).
13	Diseases	No	
A.	Rhizome (soft) rot	Drenching with 0.3% Mancozeb.	Not Practiced.
B.	Leaf spot	Apply 1% Bordeaux mixture	Not Practiced.
14	Irrigation	At 15 days interval	Rain-fed
15	Harvesting	The crop should be harvested when leaves start yellowing and gradually dry up.	Depending upon the rhizome size and weight they harvest.
16	Intercultural practices	Mulching after 40 days	Mulching done after 50 days.
17	Yield (fresh rhizome)	15 to 20 MT/Ha	15 MT/Ha

Department of Statistics & Economics 2014-15 Assam

Cost of cultivation (for 1 Ha. Area)

Cost/Recn. items	Units	Quantity	Rate	Total in INR
Labour & tractorization				
Land preparation	Per Ha.	3	5000	15000
Pit digging and planting	DO	2000	10	20000
Manure application	DO	4	300	1200
PP application		4	300	1200
Weeding	DO	6	300	1800
Earting Up	DO	2	300	600
Harvesting	DO	2	300	600
Irrigation(2 times in growing season)		2	300	600
Total Labour		**238**		**41000**
Inputs				
Planting material	Nos.	2000	40	80000
FYM	MT	5	3	15000
Urea	Kg	375	6	2250
SSP	kg	1500	8.5	12750
MOP	kg	375	12	4500
Micro Nutrient	LS			1000
Pesticide	LS			4000
Irrigation(water Charge)	LS			1000
Total Inputs				**120500**
TOTAL COP/HA				**161500**
Productivity	MT/Ha.	15		
COP/Kg				**11**
Sale Price	Rs/kg	25		
Income from Production (INR)		**15000**	**25**	**375000**
Net Profit/Kg				**14**
Net Profit/Ha				**213500**

Marketing: Aggregation points are available within 5 kms of production clusters. These are private facilities owned by aggregators and just serve as temporary storage .Harvesting is done mostly by the aggregator against 30% cash advance extended to the farmer two-three months before harvest. Each aggregator procures from 8-14 farmers. With respect to market and marketing channels, following observations were made for the medium Fibre – Nadia Variety ginger variety

Sl.	Value Chain Actor	Buying price (Rs./MT)	Selling Price (Rs./MT)	Gross Margin (Selling – buying price)	Costs incurred (Rs./MT)	Net Margin	Share in Consumer's Rupee
1	Farm gate price(ginger farmer)	11000	25000	14000	Harvesting= 150 Shortage=2000 Packing= 150 Total =2300	11700	47%
2	Sale price of aggregator	25000	28000	3000	Costs incurred by aggregator Loading=150 Unloading =150 Transport= 1000 Market fee= Paid to Commission Agent= Total =1300	1700	6%
3	Commission Agent in market	28000	31000	3000	Loading = Transport= 0 Mandi fee= 1 Shortage= 1000 Packing= 250 Paid to Commission Agent= Total=1251	1749	6%
4	Sale price of wholesaler	31000	38000	7000	Loading = Transport= 0 Mandi fee= 1 Shortage= 2000 Packing= 250 Paid to Commission Agent=250 Total=2501	4499	12%
5	Sale price of retailer	38000	62000	24000	Loading =250 Transport= 2000 Mandi fee= Shortage= 3000 Unloading =250 Packing= 250 Total=5750	18250	29%
							100

Issues, Challenges & Gaps - Ginger in Assam:

1. No use of Organic pesticides: Farmers are lacking knowledge in using pesticides either traditional or unconventional way.
2. Lack of training to farmers: Farmers lack training in package of practice with respect to usage of fertilizers, proper use and dosages of agrochemicals. Further, there is no use of micronutrients by farmers in Ginger cultivation, neither there is any use of bio-fertilizers and bio-control agents
3. Road connectivity and distance to market: Nearest all weather roads to the cluster is 20 to 60 kilometers away. Reaching the produce to the road is a great hindrance.
4. Lack of market information and intelligence: Timely and accurate information flow to the farmers is poor. The sources of information for the farmer are very limited and those too are not reliable.
5. Market: Market infrastructure is very poor. Transactions take place on the basis of one to one negotiations.
6. Absence of Ginger processing industries: There is no major processing unit for ginger in entire northeast India.

Constraints & Opportunities at Each Stage of the Value Chain

Stage	Constraint
Input Supply	i) Inadequate knowledge and unavailability of quality seeds/planting material

	ii) Insufficient technical knowledge on plant protection measures
Production	i) Heavy Prevalence of Rhizome rot disease ii) Traditional cultivation, post harvest & handling operations
Post Production	i) Lack of cleaning/washing facility ii) Inefficient processing technology iii) Dearth of knowledge & skill levels
Marketing	i) Multiple taxes and unofficial payments during transportation ii) Limited access to finance iii) Limited collective marketing practices and low bargaining power
Stage	**Opportunity**
Input Supply	Strong demand for quality agricultural inputs and planting material. A seed supply chain can be established with assured viability
Production	i) Enhancing the production & productivity through GAP & IPM interventions ii) Improved post-harvest practices - Cleaning, sorting and grading are the basic post harvest handling practices, which can be easily adapted at farmers' level. Those simple post harvest handing practices can add value to the product and get more price by producers iii) Harvesting and selling of mother rhizome during off-season
Processing	i) Establishment of farm gate primary processing units ii) Integrated chain of aggregation and handling for consistent flow of materials iii) Product diversification and value addition
Marketing	i) Formation of cluster level marketing agencies for aggregated sales and revenue generation ii) Involvement of female folks in the backward integration of raw materials and forward linkages iii) Assuring linkages to secondary and tertiary processing centres for higher returns

SWOT Analysis:

1. **Strengths:**
    - The climatic diversity of the state is suitable for the cultivation of wide varieties of Ginger.
    - Ginger industry is export-orientated and Northeast India Ginger is firmly established as one of the leading ginger producer of Asia.
    - Quality of Ginger has wide market acceptability and Assam Ginger is tagged (Geographical Identification) for its pungency.
2. **Weaknesses:**
    - Small-scale farmers do not have sufficient access to credit, transport and storage infrastructure and markets - difficult to participate in commercial agriculture.
    - Small-scale farmers lack access to advance farming technologies thus reducing their global competitiveness.
    - The Ginger industry is cost intensive and requires high levels of investment required during out of stock seasons.
3. **Opportunities:**
    - Essential oils present in this ginger are high, where high economic branded products can be made.
    - Increasing demand for organically grown spices.
    - Growing market for value added products.
4. **Threats:**
    - Increasingly higher input costs.
    - Ginger crop is particularly prone to pests and diseases due to high humidity and regular showers in Assam.
    - The Ginger industry face serious international competition and Processors should be become increasingly cost competitive by branding its GI.

Upgrading Strategies

For the identified challenges in ginger clusters of Assam, following up gradation strategies are suggested:

Sl.	Challenge/Issue	Strategy
1	No use of Pesticides	Demonstrations and training to the farmers
2	No mechanization	
3	Cultural practices are absent	
4	Lack of training to farmers	
5	Road connectivity	Road improvement
6	Lack of market information and intelligence	Placing a mechanism to collect and disseminate timely accurate market and weather information to the farmers on regular basis
7	Market infrastructure and practices	Development and improvement of market yards
8	Absence of processing industries	Introducing contract farming between Ginger farmers in the cluster and processing industries away from the cluster immediately

Action Plan:

Sl.	Strategy	Activities to be done
1	Uniform varietal selection of Nadia, Maran & Rio-de-Janerio varieties from local and indigenous varieties to boost productivity	Village Adoption programme for True Varietal Lines Development of primary & secondry hardening nurseries Total area to be covered = 10, 000 ha (app)
2, 3 & 4	Demonstrations on recommended package of practices	In the APART prioritized clusters, demonstrations of PoPs will be done. Recommended doses of fertilizers and agro chemicals will be focused Total demos=5 demos X 15 clusters X 7 years= 525 demos
5	Formation of FPOs and creation of Common Service Centres (CSCs) with primary processing facilities	One FPO/cluster i.e. 15 FPOs. Roughly 15 common Service Centres (for all agri horti commodities). CSC covered area around 1500 sq ft.
6	IEC Campaign on primary handling of Ginger	ATMA will be involved in primary handling of ginger primary handling practice campaigns. These campaigns will cover aggregators, traders, consumers and will be carried out in all major towns of project districts
7	c. Financial education and counseling, tie up with banks for cash agents, bank mitra etc (covered in Comp C-3) d. Market Intelligence Cell (MIC) will be set up at project level in Comp C-2	Covered in respective components to avoid duplication
8	Exposure visits (domestic)	To Indian Institute of Spices Research (IISR), Calicut
9	Exposure visits (foreign)	To leading Ginger producing countries in South East Asia

Value Chain Development Plan (VCDP) for Turmeric (*Curcuma Longa* L.)

India is the largest producer, consumer and exporter of turmeric in the world. Indian turmeric is considered to be the best in the world market because of its high curcumin content. India accounts for about 80 per cent of world turmeric production and 60 per cent of world exports. Other major producers are Pakistan, China, Haiti, Jamaica, Peru, Taiwan and Thailand. Asian countries consume much of their turmeric production

Value Chain Strategy: Strengthening the varietal specific terminal market linkages of Assam Turmeric for leveraging quality specific pricing modality while facilitating value addition at source supported by a well integrated logistic network

Value Chain Action Plan:

d. Mapping the entire production base line of Assam Turmeric, with special focus on varietal attributes, growers preference, market requirement, agro-climatic suitability and establish the market linked product specifications for each variety/grade.

e. Strengthening the terminal market linkages of Assam Turmeric in its fresh form on a varietal specific market segregation approach for leveraging the product value, volume and price realization of all stakeholders

f. Promoting entrepreneurs for primary value addition focused on market driven product specifications with strong logistic network targeting product value enhancement, cost reduction and increased returns to the primary producer

District wise estimated Area, Production and Average Yield of Turmeric in Assam (2014-15)

Dist	Area	Dry Production	Fresh Production	Dry Avg. Yield	Fresh Avg. Yield
Unit	Ha	Mt	Mt	Kg/Ha	Kg/Ha
Cachar	360	767	5368	2130	14910
Hailakandi	176	126	881	715	5005
Karimganj	310	195	1367	630	4410
Goalpara	470	444	3109	945	6615
Dhubri	438	346	2422	790	5530
Kokrajhar	675	601	4205	890	6230
Bongaigaon	292	237	1656	810	5670
Kamrup(R)	769	875	6126	1138	7966
Nalbari	435	424	2969	975	6825
Barpeta	1243	1094	7657	880	6160
Darrang	614	408	2858	665	4655
Sonitpur	1073	1041	7286	970	6790
Nagaon	2063	1805	12636	875	6125
Morigaon	302	353	2473	1170	8190
Baksa	667	844	5906	1265	8855
Chirang	430	295	2062	685	4795
Kamrup(M)	243	428	2994	1760	12320
Udalguri	630	495	3462	785	5495
Jorhat	328	187	1309	570	3990
Golaghat	1311	2025	14178	1545	10815
Sivasagar	284	196	1372	690	4830
Lakhimpur	925	708	4953	765	5355
Dhemaji	405	318	2225	785	5495
Dibrugarh	335	271	1899	810	5670
Tinsukia	337	231	1616	685	4795
K.Anglong	968	978	6844	1010	7070
Dima Hasao	484	646	4523	1335	9345
TOTAL	16567	16337	114356	973	6812

Source: Directorate of Horticulture & FP Assam

Turmeric Value Chain: Actors & Activities

Actors	Input Supplier	Producer (Farmer)	Aggregator	Trader	Wholesale buyer	Retailer	Consumer
Activities	Input supply	Production	Aggregation & temporary storage	Trading	Bulk buying	Retailing	Consumption
Support Services	Transport	Extension, Banking (KCC), Rentals	Credit (banking), Warehousing	Banking, Transport, Warehousing Packing	Banking, Transport, Packing , Warehousing	Transport, Temporary storage	--
Location	Input market	Farm	Farm- aggregation point	Wholesale Market		Retail market	Household

Package of Practices

S. No.	Practices	Recommended (Government)	Actual Practice by Farmers
1	Varieties	Megha, RCT-1, Lakadong,	Megha, RCT-1, Lakadong,
2	Land Selection	Well drained medium loam	Well drained medium loam
3	Field Preparation	No	Land preparation by bullocks (100%) In valleys farmers just adjust soil through hand spaw.
4	Time of sowing	March to April	Feb to April
5	Seed Treatment	Mancozeb 75 WP (2g/l)	Seed treated with Mancozeb (practiced only by progressive farmers).
6	Seed Rate (MT/Ha)	1 to 1.5 MT/Ha	1.2 to 1.5 MT/Ha
7	Spacing	25cm * 15* 10cm (Row to row * plant to plant)	25cm*15*10cm (Row to row * plant to plant).
8	Method of sowing	Pit sowing	Pit sowing
9	Fertilizers	Urea = 20kg/Ha. Phosphorous = 60kg/Ha. Potassium = 20kg/Ha.	Not Practiced.
10	FYM	3 Tons/Hectare	2.5 tons /Hectare
11	Weeding	1st @ 40 days after planting (before second mulching) and to be repeated depending upon intensity of weed growth.	1st @ 45 days after planting (before second mulching) and to be repeated depending upon intensity of weed growth.
12	Insect Pests		
A.	Shoot borer and leaf borer	Dimethoate	Chlorpyriphos (practiced only by progressive farmers).
13	Diseases	No	

S. No.	Practices	Recommended (Government)	Actual Practice by Farmers
A.	Rhizome (soft) rot	Drenching with 0.3% Mancozeb.	Not Practiced.
B.	Leaf spot	Apply 1% Bordeaux mixture	Not Practiced.
14	Irrigation	At 15 days interval	Rain-fed
15	Harvesting	The crop should be harvested when leaves start yellowing and gradually dry up.	Depending upon the rhizome size and weight they harvest.
16	Intercultural practices	Mulching after 40 days	Mulching done after 50 days.
17	Yield (fresh rhizome)	15 to 20 MT/Ha	7.5 – 9.5 MT/Ha

Source: Director of Horticulture & FP Assam, Khanapara, Guwahati-22

Cost of cultivation (for 1 Ha. Area):

Cost/Recn. items	Units	Quantity	Rate	Total in INR
Labour & tractorization				
Land preparation	Per Ha.	3	5000	15000
Pit digging and planting	DO	2000	10	20000
Manure application	DO	4	300	1200
PP application		4	300	1200
Weeding	DO	6	300	1800
Earting Up	DO	2	300	600
Harvesting	DO	2	300	600
Irrigation(2 times in growing season)		2	300	600
Total Labour		**238**		**41000**
Inputs				
Planting material	Nos.	2000	45	90000
FYM	MT	5	3	15000
Urea	Kg	375	6	2250
SSP	kg	1500	8.5	12750
MOP	kg	375	12	4500
Micro Nutrient	LS			1000
Pesticide	LS			4000
Irrigation(water Charge)	LS			1000
Total Inputs				**130500**
TOTAL COP/HA				**171500**
Productivity	MT/Ha.	15		
COP/Kg				**11**
Sale Price	Rs/kg	20		
Income from Production (INR)		**15000**	**20**	**300000**
Net Profit/Kg				**9**
Net Profit/Ha				**128500**

Marketing:

Aggregation points are available within 5 kms of production clusters. These are private facilities owned by aggregators and just serve as temporary storage .Harvesting is done mostly by the aggregator against 30% cash advance extended to the farmer two-three months before harvest. Each aggregator procures from 8-14 farmers. With respect to market and marketing channels, following observations were made for the medium Fibre – RCT 1 Variety Turmeric variety

Sl.	Value Chain Actor	Buying price (Rs./MT)	Selling Price (Rs./MT)	Gross Margin (Selling – buying price)	Costs incurred (Rs./MT)	Net Margin	Share in Consumer's Rupee
1	Farm gate price(turmeric farmer)	11000	22000	11000	Harvesting= 150 Shortage=2000 Packing= 150 Total =2300	8700	40%
2	Sale price of aggregator	22000	25000	3000	Costs incurred by aggregator Loading=150 Unloading =150 Transport= 1000 Market fee= Paid to Commission Agent= Total =1300	1700	7%
3	Commission Agent in market	25000	28000	3000	Loading = Transport= 0 Mandi fee= 1 Shortage= 1000 Packing= 250	1749	6%

Sl.	Value Chain Actor	Buying price	Selling Price	Gross Margin	Costs incurred (Rs./MT)	Net Margin	Share in Consumer's
					Paid to Commission Agent=		
					Total=1251		
4	Sale price of wholesaler	28000	32000	4000	Loading =	2499	8%
					Transport= 0		
					Mandi fee= 1		
					Shortage= 1000		
					Packing= 250		
					Paid to Commission Agent=250		
					Total=1501		
5	Sale price of primary processor	32000	42000	10000	Loading =250	4500	10%
					Transport= 2000		
					Mandi fee=		
					Shortage= 3000		
					Unloading =250		
					Packing=		
					Total=5500		
6	Sale price of value added retailer	42000	64000	22000	Loading =250	18250	29%
					Transport= 2000		
					Mandi fee=		
					Shortage= 1000		
					Unloading =250		
					Packing= 250		
					Total=3750		

Issues, Challenges & Gaps - Turmeric in Assam:

1. No use of Organic pesticides: Farmers are lacking knowledge in using pesticides either traditional or unconventional way.
2. Lack of training to farmers: Farmers lack training in package of practice with respect to usage of fertilizers, proper use and dosages of agrochemicals. Further, there is no use of micronutrients by farmers in Turmeric cultivation, neither there is any use of bio-fertilizers and bio-control agents
3. Road connectivity and distance to market: Nearest all weather roads to the cluster is 20 to 60 kilometers away. Reaching the produce to the road is a great hindrance.
4. Lack of market information and intelligence: Timely and accurate information flow to the farmers is poor. The sources of information for the farmer are very limited and those too are not reliable.
7. Market: Market infrastructure is very poor. Transactions take place on the basis of one to one negotiations.
8. Absence of Turmeric processing industries: There is no major processing unit for Turmeric in entire northeast India.

Constraints & Opportunities at Each Stage of the Value Chain

Stage	Constrain
Input Supply	i) Inadequate knowledge and unavailability of quality seeds/planting material ii) Insufficient technical knowledge on plant protection measures
Production	i) Heavy Prevalence of Rhizome rot disease ii) Traditional cultivation, post harvest & handling operations
Post Production	i) Lack of cleaning/washing facility ii) Inefficient processing technology iii) Dearth of knowledge & skill levels
Marketing	i) Multiple taxes and unofficial payments during transportation ii) Limited access to finance iii) Limited collective marketing practices and low bargaining power
Stage	**Opportunity**
Input Supply	Strong demand for quality agricultural inputs and planting material. A seed supply chain can be established with assured viability
Production	i) Enhancing the production & productivity through GAP & IPM interventions ii) Improved post-harvest practices - Cleaning, sorting and grading are the basic post harvest handling practices, which can be easily adapted at farmers' level. Those simple post harvest handing practices can add value to the product and get more price by producers iii) Harvesting and selling of mother rhizome during off-season
Processing	i) Establishment of farm gate primary processing units ii) Integrated chain of aggregation and handling for consistent flow of materials iii) Product diversification and value addition
Marketing	i) Formation of cluster level marketing agencies for aggregated sales and revenue generation

Stage	Constrain
	ii) Involvement of female folks in the backward integration of raw materials and forward linkages iii) Assuring linkages to secondary and tertiary processing centres for higher returns

SWOT Analysis

1. **Strengths:**

- The climatic diversity of the state is suitable for the cultivation of wide varieties of Turmeric.
- Turmeric industry is export-orientated and Northeast India Turmeric is firmly established as one of the leading Turmeric producer of Asia.
- Quality of Turmeric has wide market acceptability and Assam Turmeric is tagged (Geographical Identification) for its pungency.

5. **Weaknesses:**
   - Small-scale farmers do not have sufficient access to credit, transport and storage infrastructure and markets - difficult to participate in commercial agriculture.
   - Small-scale farmers lack access to advance farming technologies thus reducing their global competitiveness.
   - The Turmeric industry is cost intensive and requires high levels of investment required during out of stock seasons.
6. **Opportunities:**
   - Essential oils present in this Turmeric are high, where high economic branded products can be made.
   - Increasing demand for organically grown spices.
   - Growing market for value added products.
7. **Threats:**
   - Increasingly higher input costs.
   - Turmeric crop is particularly prone to pests and diseases due to high humidity and regular showers in Assam.
   - The Turmeric industry face serious international competition and Processors should be become increasingly cost competitive by branding its GI.

UPGRADING STRATEGIES:

For the identified challenges in Turmeric clusters of Assam, following up gradation strategies are suggested:

Sl.	Challenge/Issue	Strategy
1	No use of Pesticides	Demonstrations and training to the farmers
2	No mechanization	
3	Cultural practices are absent	
4	Lack of training to farmers	
5	Road connectivity	Road improvement
6	Lack of market information and intelligence	Placing a mechanism to collect and disseminate timely accurate market and weather information to the farmers on regular basis
7	Market infrastructure and practices	Development and improvement of market yards
8	Absence of processing industries	Introducing contract farming between Turmeric farmers in the cluster and processing industries away from the cluster immediately

Action Plan:

S. No.	Strategy	Activities to be done
1	Uniform varietal selection of Megha, RCT-1, Lakadong varieties from local and indigenous varieties to boost productivity	Village Adoption programme for True Varietal Lines Development of primary & secondry hardening nurseries Total area to be covered = 10, 000 ha (app)

S. No.	Strategy	Activities to be done
2, 3 & 4	Demonstrations on recommended package of practices	In the APART prioritized clusters, demonstrations of PoPs will be done. Recommended doses of fertilizers and agro chemicals will be focused Total demos=5 demos X 15 clusters X 7 years= 525 demos
5	Formation of FPOs and creation of Common Service Centres (CSCs) with primary processing facilities	One FPO/cluster i.e. 15 FPOs. Roughly 15 common Service Centres (for all agri horti commodities). CSC covered area around 1500 sq ft.
6	IEC Campaign on primary handling of Turmeric	ATMA will be involved in primary handling of Turmeric primary handling practice campaigns. These campaigns will cover aggregators, traders, consumers and will be carried out in all major towns of project districts
7	e. Financial education and counseling, tie up with banks for cash agents, bank mitra etc (covered in Comp C-3) f. Market Intelligence Cell (MIC) will be set up at project level in Comp C-2	Covered in respective components to avoid duplication
8	Exposure visits (domestic)	To Indian Institute of Spices Research (IISR), Calicut
9	Exposure visits (foreign)	To leading Turmeric producing countries in South East Asia

Annexure-C1.1 (d): Participatory seed production in rice, pulses, oilseeds and potato

Crop	No. of District	Area in each district In each year	Unit (ha)	Unit cost (Rs)	Total Area (ha)
Rice	7	50	1.0	32237.00	350
Blackgram	5	10	1.0	31062.00	50
Lentil	4	10	1.0	31059.00	40
Pea	5	10	1.0	38175.00	50
Rapeseed and mustard	7	20	1.0	26859.00	140
Potato	4	10	1.0	83793.00	40
Total (per annum)					670

Annex-C.1.1 (e): Brief Proposal for Up-Gradation of existing Commercial Tissue Culture Lab

Assam Agriculture University (AAU) proposes a project to address the problem of availability of quality planting material of Banana. Commercial Tissue Culture Lab (CTL), Department of Agricultural Biotechnology, Assam Agricultural University has standardized the protocol for micropropagation of several indigenous cultivars like Malbhog, Bor Jahaji, Chapor Jahaji, Amrit Sagar, Grand Naine etc. At present the protocol is based on the use of semi-solid medium and we are producing 1,00,000 -2,00,000 tissue culture banana plantlets per annum. As such, planting material produced through these protocols are not cost-effective. To scale up the present production from 2 lakhs to at least 10 lakhs tissue culture banana plantlets, we need to upgrade the exiting commercial tissue culture lab to semi-automation using partially filled bioreactors. Therefore, the aim of the proposed project is to upscale the current protocols to a level where semi-automation can be introduced and cost-effective commercial cultivation is sustainable.

Objective: Establishment of semi-automated micro-propagation technique of indigenous banana cultivars of NE India using partially filled bioreactors.

Work done so far: Commercial Tissue Culture Laboratory (CTL), Department of Agricultural Biotechnology, Assam Agricultural University has established very efficient and reliable *in vitro* regeneration system of banana cv. Borjahaji, Amrit Sagar and Grand Naine through vegetative buds to generate virus free quality planting material. The CTL is generating 100000 to 200000 tissue culture banana cv. Amrit sagar, G9 and Borjahaji through tissue culture. However there is growing demand for other local varieties of banana like Malbhog, Bhim kol, Kach Kol and Chapor jahaji. To address the growing demand we propose to establish semi-automated *in vitro* regeneration system of these banana cultivars using partially filled bioreactors.

Work Plan, methodology and timelines

- Establishment of a research protocol for scaling up for commercialization through temporary immersion bioreactors of indigenous banana cultivars like Malbhog, Bor Jahaji, Chapor Jahaji, Amrit Sagar, Grand Naine, Kach Kol and Bhim Kol for meeting the ready demand for the banana growers round the year.

9. Consolidated Budget

Non-Recurring:

Sl.	Items	Number/ Quantity	1st year	2nd year	3rd year	Total (Rs. in Lakh)
1.	Bioreactors 10 liters	200	Feasibility Study for tissue culture banana will be carried out	400.00	-	400.00
2.	Laminar Air Flow Cabinet (Double Size)	10		40.00	-	40.00
3.	Autoclave (Horizontal)	2		15.00	-	15.00
4.	Electronic Balance	2		2.00	-	2.00
5.	pH Meter	2		2.00	-	2.00
6.	Hot air oven	2		4.00	-	4.00
7.	Microwave oven	1		0.50	-	0.50
8.	Magnetic Stirrer	2		1.00	-	1.00
9.	Water Distillation Unit	2		5.00	-	5.00
10.	Refrigerator	4		2.00	-	2.00
11.	Air Conditioners with stabilizers	6		4.00	-	4.00
12.	Dish Washing Machine	2		2.00	-	2.00
13.	-20°C Freezer	1		5.00	-	5.00
14.	Computer with Accessories	1		1.00	-	1.00
15.	Poly house benches/Net House 100 Sq.mt	2		8.00	-	8.00
16.	Gas Connection	5 cylinder		0.50	-	0.50
17.	Trolley (for transportation culture/plantlets)	10		1.00	-	1.00
Total				**493.00**		**493.00**

Recurring

Sl.	Items	Quantity	1st year	2nd year	Total (Rs. in lakh)
1.	Consumables (Chemicals and Glasswares and kits)	Bulk		40.00	40.00
2.	Skilled Labour (@ 350/- per day for 350 man days)	10		12.25	12.25
3.	Unskilled labour @ 300/- per day for 150 man days	5		5.25	5.25
4.	Coco peat Mixture, soil, manure etc.	Bulk		10.00	10.00
5.	Polythene bags	Bulk		5.50	5.50
6.	Working contingency	-		10.00	10.00
7.	Travel	-		1.00	1.00
Sub-Total				**84.00**	**Say 84.00**

Grand Total (Non-Recurring + Recurring) = 597.00 Lakhs (Five hundred ninety seven lakh only).

Cost analysis of Tissue Culture Laboratory

Anticipated outcome

- The most anticipated outcome of the proposed project is optimization of advance technique of mass multiplication of banana cultivars through partially immersion and/or temporary filled bioreactors for cost-effective production.
- Continuous supply of disease free banana plantlets of Malbhog, Bor Jahaji, Chapor Jahaji, Bhimkol, Kach Kol, Grand naine and Saberi which can enhance banana production in Noth Eastern Region (NER).
- Technologically empowerment of the NE region.
-

Target of Production (in lakhs):

Banana variety	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year
Grand Naine	0.20	0.50	1.00	2.00	4.00	4.00	4.00
Bor Jahaji	0.10	0.50	1.00	1.00	2.00	2.00	2.00
Amrit Sagar	0.10	0.50	1.00	1.00	2.00	2.00	2.00

Banana variety	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year
Malbhog	0.10	0.50	1.00	1.00	2.00	2.00	2.00
Total	**0.50**	**2.00**	**4.00**	**5.00**	**10.00**	**10.00**	**10.00**

Cost Benefit Ratio:

The cost of production of tissue culture banana seedlings will be Rs. 6.00/per plant, we will sell at the rate of Rs. 15.00/plants. The profit per plant will be Rs 9.00/Plant.

Explant (vegetative Bud) cost : Rs 1/ Explant

Nutrient Medium Cost : Rs 2/ seedling

Manpower cost : Rs 3/ seedling

Total cost of production per seedling : Rs. 6.00/ Seedling

Sale price of tissue culture seedling : Rs.15.00 /Seedling

The profit per plant will be = Rs 9.00/Seedling

Total seedlings produced in seven years will be = 41.5 lakhs of seedlings

Selling price / seedling is = Rs 15.00/Seedling

Total income generation will be = Rs. 622.50 lakhs

Total investment is = Rs. 597.00 lakhs

Therefore, at the end of seven years the investment cost will be recovered including the nonrecurring items and the laboratory will be self sufficient one.

Annexure –C1.1 (f) List of farm equipments to be popularized

Sl.	Name of Equipment	Use	Approx cost	Quantity	Total cost
1.	Octagonal & Tubular Maize Sheller	Maize shelling by hand	500	50	25000
2.	Bordoli Seed Drill	Seed sowing	8000	25	200000
3.	Paddy Drum Seeder (8 Row)	Paddy sowing	6000	50	300000
4.	Seed drill for Upland Paddy or Lin Seed (three wheeler)	Sowing	15000	25	375000
5.	Seed drill for Maize or Groundnut (three wheeler)	Sowing	15000	25	375000
6.	Mustard seed drill 2 row	Sowing mustard	15000	50	750000
7.	Power tiller zero till seed drill	Large seed	25000	25	625000
8.	Power tiller inclined plate planter	Planting	35000	25	875000
9.	Power paddy weeder	Weeding	55000	25	1375000
10	Maize planter (Power tiller operated)	Planting of maize	100000	25	2500000
11	Potato planter	Planting of potato	130000	10	1300000
Total				**325**	**8700000**

Annex-C.1.1 (g): Guidelines for organizing & monitoring of demos. & tracking adoption rates

Farmer selection for demonstration

- A progressive farmer from the community should be selected. It should be ensured that he has the capability and resources to follow the instructions provided by the experts in a timely and complete manner.
- He should also be capable of and must agree to disseminate the demonstrated technologies to fellow farmers in the village(s) and the adjoining areas.
- He must provide labor for carrying out all operations for preparation of land, completion of complete package practices (sowing, fertilizer application, water management, pest and weed management, etc) up to harvesting of the crop in a timely manner.
- He must agree to use all the inputs provided by the project (like seed, fertilizer, IPM, etc.) for the demonstration plot only, and should neither sell these nor divert their use on his other land.
- In case of self pollinated crop demonstrations, he should agree to sell/exchange the seed produced from the demonstration plot to other farmers in the village/adjoining villages on the terms decided by the project staff. This may include the prevalent rate in the village plus small additional amount in view of the good quality of the variety.
- He should agree to grow a small control plot by following the farmer's practice in the area. This is required for comparison of results with the improved package of practices followed in the demonstration plot.
- Different farmers should be selected for different demonstrations, ensuring that the project benefits do not go only to a few farmers.
- He must own the land for organizing the demonstration which meets the following criteria for site selection.

Demonstration Site selection criteria:

- The plot selected for the demonstration should preferably be on the road side and should be easily accessible. This is necessary for organizing trainings and field days at the demonstration site as well as for showing the benefits to the farmers who pass by the demonstration site.
- The soil type of the plot should be representative of the area.
- The exact area of the demonstration plot should be known and should have boundary bunds.
- The plot should be leveled and should have access to irrigation facilities.

Important guidelines for Organizing the demonstration: Although the specific details will be determined by the nature of the demonstration and will vary from one demonstration to another, the following aspects should be given adequate attention for organizing good crop demonstrations:

- Although the demonstration is organized on the land of one farmer, the larger village community should be informed that it is being organized to disseminate improved technologies and practices to a large number of famers in the village so that they are able adopt them in the following years and increase their productivity and income.
- The treatments in the demonstration should be kept simple – one small control plot showing farmers' prevalent practice for growing that particular crop, vegetable, fruit, etc in the area, and the rest of the plot should have the complete integrated crop management technology including improved seed, recommended fertilizer dose, irrigation/rainwater management, weed control, pest management, etc. Special attention should be given to include critical inputs and management practices which have high payoff but are generally not used by the farmers in the area.
- 3 training sessions should be organized at the demonstration site preferably around the sowing time and critical stages of the crop to educate the farmers about all the critical inputs and practices which are to be followed for obtaining the highest yield. These trainings should be given wide publicity in advance to ensure that large

numbers of farmers participate. Simple brochures or handouts (in local language) listing key practices and operations should be distributed to the all participating famers.

- Special attention should be given to ensure proper plant population since one of the main reasons for low productivity is poor plant population.
- Soil of the demonstration plot should be tested well in advance so that soil test based application of fertilizers may be taken up.
- All operations in the demonstration plot should be done at the optimum stage of the crop to obtain maximum yield.
- All other precautions and steps should be taken so as to demonstrate that the crop in the demonstration plot is visibly much better than the farmer's practice control.
- At maturity, the crop should be harvested and the yield of the control plot compared with the demonstration plot for quantifying increase in productivity and potential additional income obtained as a result of adoption of the improved technology demonstrated.
- It should always be kept in mind that an on-farm demonstration is a powerful tool to demonstrate the benefits of improved practices to the farmers and not an end in itself. The objective should be to use the on-farm demonstrations for disseminating improved practices to large number of farmers in the cluster villages and not only a physical target for completing certain number of demonstrations.
- As seeing is believing, a field day should be organized at the site of demonstration for showing the benefits of adopting the improved practices to the farmers. This should be done at a stage when marked differences in crop condition and expected yield between the demonstration plot and the control plot are clearly visible. Normally the appropriate time for organizing the field day is shortly before the harvesting of the crop.
- The date of the field day should be decided well in advance and this should be given wide publicity in the village and adjoining villages.
- Steps should also be taken to ensure participation of staff from the concerned line departments like agriculture, horticulture and animal husbandry etc.
- Steps should be taken to ensure that large number of farmers attend the field day.
- On the field day the famers should be shown the control and demonstration plots and encouraged to discuss the likely benefits from the demonstrated technologies. A training session should be organized by the project staff to educate the farmers about what has been done in the demonstration plot which is different from the practice normally followed by them; when was it done, how and why; what are the likely benefits; etc. Special attention should be given to educate the farmers about the critical inputs, operations and practices which they should follow to obtain highest productivity levels. In addition to short lectures covering specific aspects, famers should given free time to ask questions so that it is more of an interactive and question answer session rather than a lecture by an expert.
- Special attention should be given to ask the farmers if they would like to adopt the demonstrated technologies on their farms in the next crop season and tell them where from they can obtain various inputs like seed, fertilizer, plant protection and weed control materials, how they should carry out all the operations at the optimum stage of the crop, wherefrom they should obtain technical guidance, the difficulties they are likely to face in procuring the required inputs and adopting the improved practices, and how these can be addressed.
- Since seed is a critical input and acts as a catalyst in the adoption of other practices, in case of self pollinated crops some arrangements should be made to distribute the seed of the demonstration plot to other farmers in the village/adjoining villages.
- The date of crop cutting, which will take place sometime after the field day, should be announced in the field day. The farmers should be invited to come on that day so that they can actually see the increase in productivity as a result of adoption of improved technologies demonstrated in the plot.

Facilitating adoption of the demonstrated technologies by large no. of farmers: The objective of the demonstrations is achieved only if large numbers of farmers in the cluster villages adopt the critical demonstrated practices on their fields in the years following the crop season in which the demonstration is organized. In order to accomplish this, the famers should be encouraged to achieve this by organizing meetings in the village before the sowing season of the crop in the following year (s). Technical guidance and support should be provided to enable the farmers to acquire the required inputs by tapping into the other ongoing schemes funded by Govt. of India and the GOA, like Rashtrya Krishi Vikas Yojna (RKVY), National Food Security Mission (NFSM), Mission for Integrated Development of Horticulture (MIDH), State Extension Reforms scheme, etc. Linkages should also be established with the state line departments of Agriculture and Horticulture, for achieving large scale adoption of the demonstrated practices by the farmers. Based on the response, an enhanced target for the subsequent years may be fixed. In order to promote continuity, if possible, demonstrations should be organized in the same village or adjoining villages in the following years on the land of a different farmer.

Annexure –C1.1 (h) Details of On Farm Testing (Adaptive trials)

Crop	No. of District	No. of Variety/ Technology	No. of OFT in each district	Unit size (ha)	Unit cost (Rs)	Total no. of unit
Rice	7	10	5	0.25	3250	350
Maize	8	5	5	0.25	3695	200
Greengram	5	5	5	0.25	3390	125
Blackgram	5	5	5	0.25	3390	125
Lentil	4	5	5	0.25	3515	100
Pea	5	5	5	0.25	4544	125
Rapeseed & Mustard	7	5	5	0.25	3427	175
Cabbage	9	5	5	0.25	6190	225
Cauliflower	10	5	5	0.25	5994	250
Brinjal	9	5	5	0.25	7181	225
Tomato	9	5	5	0.25	6595	225
Banana	9	2	**2**	**0.25**	**32500**	**36**
Total					**Av.83671/12=6972 Say 7000**	**2061**

Annexure –C 1.1(i) Details of Front Line Demonstration (FLD)

Crop	No. of District	No. of Variety/ Technology	No. of FLD in each district	Unit size (ha)	Unit cost (Rs)	Total units
Rice	7	10	4	1.0	21234.00	280
Maize	8	6	5	1.0	24780.00	240
Greengram	5	5	5	1.0	24062.00	125
Blackgram	5	5	4	1.0	24062.00	100
Lentil	4	5	5	1.0	24059.00	100
Pea	5	5	5	1.0	28175.00	125
Rapeseed and mustard	7	8	4	1.0	23859.00	560
Total					24319.00(AV)	1530

Annexure-C 1.1 (j): Training Modules

a. Production Technology and post harvest management of commercially Important field and horticultural crops for BTM and ATM
b. Productivity enhancement and promotion of secondary agriculture for other Departmental and ATMA Staff
c. Commercial Production of Horticultural Crops for Nursery Growers
d. Orientation Programme on Overview of APART for Scientists of AAU

Annexure-C 1.2 (a): Value Chain Development Plan for Piggery Value Chain

Introduction

Despite being small-scale (generally one to five crossbred pigs), production contributes significantly to the livelihood of the majority of pig-rearing households. There are indications that pig production is gaining popularity as a source of income generation in communities also, that do not have a tradition for rearing pigs. With availability of breeding options now, though traditional management practices continue to dominate in pig production, scavenging systems have given way gradually to tethering or penning and most indigenous pigs have been replaced by crossbreeds. Crosses of the Large Black and Hampshire breed (and the Ghungroo in Kokrajhar) are preferred now over other pure exotic breeds.

Production clusters

District-wise Identified pig production cluster with proposed FPO & identified livestock Market

Sl. No.	District	Potential Cluster (nos)	No of Block involved	Proposed CSC	Proposed FPO/ FPC (Nos)	Total cluster Linked Markets	Selected Market
1	Golaghat	6	6	0	0	3	2
2	Jorhat	3	3	3	3	2	1
3	Barpeta	1	1	1	1	1	1
4	Lakhimpur	4	4	1	1	4	2
5	Morigaon	2	2	1	1	2	2
6	Dhubri	0	NIL	NIL		2	0
7	Darrang	3	3	2	2	4	2
8	Sonitpur	9	9	7	7	8	2
9	Goalpara	4	4	4	4	4	2
10	Nalbari	1	1	1	1	2	
11	Karbi Anglong	7	7	5	5	5	2
12	Kokrajhar	4	4	2	2	5	3
13	Sivasagar	6	6	6	6	3	2
14	Kamrup	6	6	5	5	6	6
15	Cachar	0	NIL	NIL		0	0
16	Nagaon	0	NIL	NIL		0	0
	TOTAL	**56**	**56**	**38**	**38**	**51**	**27**

District Wise Existing Production Clusters (Minimum 2-3 Pigs Per Pig Rearing Family)

DISTRICT	Dev. Block	Cluster (Min 100 families)	Villages	Approx Pig rearing families	Approx. pig population	Major Linked Market
Golaghat	Dergaon	Dergaon	Bahgani, Bohikhuwa, Dhemaji, Dani Chapari	260	650	
	Gomariguri	Gomariguri	Adarshgaon, Kalajar	150	375	Gamariguri
	Bokakhat	Bokakhat	No-5 Da gaon, Chapari gaon	120	300	Behora
	Sarupather	Sarupather	Khanikar, Nagajal , Kharua, Naharbari	265	663	Barpathar
	Bokakhat	Bokakhat	Bohikhowa, Bhelaguri, Jugalati, Dergaon	294	735	
	Marangi	Marangi	No 1 Rongbong, No 2 Rongbong, Letekuchapari, Borboria	260	650	
Jorhat	Ujani Majuli	Ujani Majuli	Thakurchuti, Koliagaon, Nagaochuk, Karkichuk,Rangachahi,swarnasri,Borpomua, Kumarbari, Cherepai, Majdeuri, Ratanpur miri, Gajera, Sonowal Kochari, Luitporia, Sriram, Ratanpur gayan	5750	14375	Jengraimukh ,
	Dekorgarha	Dekorgarha	Bahphala, Upardeuri, Namdeuri	320	800	
	Majuli	Majuli	Uparsumurimari,Lowarsamurimari,Kaniajn, Hokonamukh, Upper Sonowal, Baligaon,Jharonigaon, Derghergaon, Randhanichuk, Bahbora, Morituli, Sonapara, Putuki, Tmuloni, Akholachuk, Charighoria, Mohorichuk, Malapindha, Borgoyan - 3, Borgoyan - 2, Borgoyan - 1, Sitadar, Gotiamari, Dhopatgaon,	4128	10320	Borgoya.
Barpeta	Bajali	Bajali	Palah, Upornoi, Dubi, Borshahan, PubRehabari, bandhe sidhani, garh, Saradhara, Goremari	1195	2988	Barama
Lakhimpur	Narayanpur	Narayanpur	Kinapathar, Majorchapori, Panbari Missing gaon, Bahgora Deuri gaon, Dhunaguri missing gaon	850	2125	Harmutti
	Ghilamora	Ghilamora	Bakula Maghuachuk, Arengiaboragaon, Ubhota sampora	230	575	Ghilamara
	N Lakhimpur	N Lakhimpur	Kuwarigaon, Boisagaon, Ahuchaulgaon, Bogolijan, Changmaigaon	377	943	Lakhimpur
	Boginodi	Boginodi	Majgaon, Harionigaon, Honpur	247	618	Boginadi
Morigaon	Bhurbandha	Bhurbandha	Patidoya, Ouguri, Moinagaon, Bhurbondha, Khatabori	480	1200	Morigaon
	Kapili	Kapili	Pachim Nagaon, Konabori, Pharanhkuchi, Thekeraguri,	243	608	Jagiroad

DISTRICT	Dev. Block	Cluster (Min 100 families)	Villages	Approx Pig rearing families	Approx. pig population	Major Linked Market
			Ahatguri			
Darrang	Kalaigaon	Kalaigaon	Akelabari, Bahjani, Durgagaon,	341	853	Kolaigaon, Ramhari
	Pachim Mangaldoi	Pachim Mangaldoi	Medhipara, Bezpara, Gelaidingi, Chamuapara, Daha, Barangabari, Kachamari, Adhikari, Moza chuburi, Barhampur, Nagaon, Kuiyapani, Saruthekerabari, Borkumarpara, Pakabangipara, Bhalukkhowapara, Borthekerabari, Chelengeliapara, Kamarpara, Konwarpara, Baniyapara,	562	1852	Bongalgora
	Sipajhar	Sipajhar	Khatara, Khasdipila, Nagaon (Hatimuria), Dagiapara, Kamargaon, Mahuripara, Bamunjhar, Mahtoli, Kahotoli,	453	1476	Baminjhar
Sonitpur	Borsala	Borsala	Natun Chingri, Nambogoribari, Borigaon Kamarchuburi	152	380	Borsola
	Dhekiajuli	Dhekiajuli	Bhekerigaon,Chenga, Hiloi, Ghagrakochari	537	1343	Dhekiajuli
	Rangapara	Rangapara	Kheronibasti	61	153	
			kerabasti	72	180	
	Balipara	Balipara	Baligao Miri, Bokagaon Miri, Mulangaon, Amloga	818	2045	Balipara
	NA Duar	NA Duar	Bongaon, Khristan Basti, Bordikorai, Toubhanga, Bheleuguri, Patharbasti	823	2058	Bordikrai, Toubhanga,
	Sakomatha	Sakomatha	Majuligarh, Dhuli, Dihingpathar, Kherbari, Missamari, Karbi Block, Nihansang, Selaikati, Joypur	823	2058	
	Baghmara	Baghmara	Monabari basti, Bihapukhuri kachari, Dishiri, Bamgereki, Dagereki, Lahorijan, Rongajan, Naharbari, Birijan, Kalahandi basti	490	1225	
	Bihali	Bihali	Maghi, Padum Pukhuri,Borajuli,Singimari, Kachamari, Natun Chang, Kalaguri Jarani, Bihmari Jarani, Bihmari Boragaon, Bihmari Thandapani, Nanke Bihmari, Borajuli TE, Bedeti TE, Lalpukhuri,	512	1536	Bedeti, Borgang
	Chayduar	Chayduar	Joriguri, Mukaligaon, Aribhanga pathar(Mayang), Phatiabari, Benugaon, Arakhuti, Lepetpara, Balijan, Laudangia	670	1675	Gohpur
Goalpara	Rongjuli	Rongjuli	Maslam, Kurihamari, Kothakuthi, Ambuk, Khutabari, Kahibari, Khilamara, Simlitola,Sardarpara, Gathiapara Dhanudbhanga ,Salpara, Patpra	1418	4254	Dhupdhora, Rongjuli
	Kuchdhuwa	Kuchdhuwa	Khara Medhipara, Kuchdhuwa, Sessapani, Kaljhar	462	1386	
	Balijana	Balijana	Rampur, Agia, Dakurvita Goalpara, Rakhaplara, Sarapara, Ketekibari, Dariduri, Bodamal Rongsai, Kuruabhasa, Ananda Bazar, Makri	1385	4155	Agia, Balijana
	Lakhipur	Lakhipur	Kalyanpur, Baijuri, Bolaikhamar, Bordol, Pukhuripara, Boro Singri, Lakhipurtown, Bhalukdubi	1091	3273	
Nalbari	Borigog & Bongaon	Borigog & Bongaon	Mahima, Shantipur, Sateribari, Dhamdhama,Balitera, Naharbari	364	911	Dhamdhama , Barama
Karbi Anglong	Bokajan	Bokajan	Kachari gaon, Mainapuri, Bormanthi	236	590	
	Lumbajong	Lumbajong	Nepali Basti, Adorsho, Bhetagaon, Dimaidi, Nagachang, Hidim Teron, Upper Ekorani, Lower Ekorani ,Dhansing Teron, Rongnokse, Hondem timung Arong, Phonglangso, Rongchingri, Rongchingdon, Kakati Ronghang Arng, Hemari Ronghang Arong, Mensing Ronghang , Arong, Serlongbi, Beltola, Rongkhelang Jensing Timung Arong	2372	5930	Diphu, Manja, Dhansiri.
	Howraghat	Howraghat	Bongtok Terang , Kumoi Ronghang, Habe Kathar, Patar Timung, Sikaripathar, Sikarigate, Sikarighat Dimasagaon, Jiteplong, Mohiram Taro, Patradisha, Sarsing Engti, Baliram Engti,Kehai Kro, Langchitim, Pan Engti , Rongmili, Bura Kiling, Long Terang, Baligaon, Rongkhot Harijon Basti, Rongkhot Chauhan, Kalai Gaon - 1, Kalai Gaon - 3, Bali Gaon , Hongkram	3066	7665	Hawraghat
	Rongkhang	Boithalanso	Edenbari, Mahajan Timung, Ambinong, near Saturday market, Porbot, Near New Market, Umteli, Near Old Market.	585	1463	
	Amri	Ulukunchi	Birsinki, Umpenai, Ulukunchi	461	1153	
	Silonijan	Silonijan	Kathkatia, Dihingia Gaon, Aturkimi, Sardeka, Langsomepi, Zing Basti , Panika Gaon, Silkhuti	949	2373	Silonijan
	Socheng	Kheroni	Rikangmihong Pt - 1, Rikangmihom Pt - 2 , Phelangpi, Priloo Makum, Durbintila, Rangmili	624	1560	
Kokrajhar	Kokrajhar	Kokrajhar	Kathalguri - 1, Kathalguri - 2, Bangladuba, Titaguri - 1, Titaguri - 2, Halowador, Magurmari Kumguri	362	905	Kokrajhar, Titaguri
	Dotoma	Dotoma	Nalbari, Belguri, Dhupguri, Saraguri, Pachim Patgaon, Borsijhora Part - 2, Batabari, Bonshigaon, Lokhnabari,	1163	2908	Dotoma

DISTRICT	Dev. Block	Cluster (Min 100 families)	Villages	Approx Pig rearing families	Approx. pig population	Major Linked Market
			Aflagaon, Banargaon, Ghoskata, Hogmabil, Habrubari no 1, Habrubari no 1, Gossainichina			
	Gossaigaon	Gossaigaon	Chekadani, Gambaribil, Raikhumbari, Boirali, Bhumka 1, Bhumka 2, Chakma, Thuribari, Sukanbaonai, Satyapur, Mohanpur, Restekpur(Bhairiguri), Dawaguri No1, Alokjhar, Gorjan no 1, Koklingbari, Kamalsing, Rajapara, Thuribari	989	2473	Gossaigaon
	Debitola	Debitola	Debitola, Gambhirkhata, Bashijhora, Kazigaon, Alupara	232	580	Debitola
Sivasagar	Khelua (Lakowah)	Khelua (Lakowah)	Afala Missing, Majarbari &Ligiribari, Boloma Missing, Lepai Chumoni, Dimowmukh, Garbhaga, Chenimora, Dighol Dorioli, Bhadhara, Betbari 2 No. Konwar, Nowjan, Tamulibazar Changmai, Khamun, Khanikar , Khelowa, Robi Gaon, Mout Moupiya, Borpatra, Bokabil, Da-Gaon, Melamora, Betonipam, Jatipotia, Dowari Gaon, Gandhia, Bakal, Lebang, Hahchara Chetia, Nimaijan, Naga Gaon, Choulkara, Moran Gaon, Haripara Ali Kochari, Bam Gohain, Jabalating Chetia, Konwar Gaon, Boiragibor, Bailung Gaon, Kohar Gaon, Punibil	5793	16894	
	Gaurisagar	Gaurisagar	Rupohimukh Mising, Jonmiri Borgaon, Thekaratol , Teliadunga	693	1733	
	Demow	Demow	Tetaliguri, Bamrajabari, Kotiori, Dolopani, Dhaibari, Balikur, Samukjan, Milonkur, Borchumoni, Tengapani	1940	4850	Rajmai
	Disangpani (Sonari)	Disangpani (Sonari)	Solmari, Borpathar, Dakshin Borpathar, Maj Pathar, Khoumtai Vill., Balikhuti Gumutha, Rangoli, Hajua jungal Block, Changmai Gaon, Moudumoni , Tifuk Kochari, Doba Grant, Lukurakhan, Porosani Habi 1 &2, Chengalimora, Mahmora Konwar, Jajali, Borchohoki, Borbil, Ram Nagar, Nirmolia, Desaw Botuwa , Kurukani Deori, Erabari , Khaloi Ghugura, Borahigaon, Bahboria,Rajapathar Raidongia, Lalati Pathar, Abhoipur Changmai Gaon	4533	11333	Sonari
	Sapekhati	Sapekhati	Nagahat, Dhadum, Kolakata, Kolakata Gohain, Moranhabi 1, Moranhabi 2, Dabaluhabi, Garkush, Bheshelipathar, Ghalaguri	1182	2955	
	Nazira	Nazira	Santak Bor Mising, Bali Gaon, Tipomia, Soladhara, Pahuchungi Deodhai, Senbessa , Henor Ali, Namati Joy Khamdang, Raboti Kopohuwa , Habi Gaon, Lahon Gaon, Singhibil, Napam Barutia	1771	4428	Simaluguri
Kamrup	Rani	Rani	Andherijuli , Sajanpara, Rajapanichanda, Hakakhabari,Rangapara, Bahupara, Puransukurberia, Belguri, Garopara, Joypur (F.V), Tanganpara, Salser, Patgaon, Umsor, Muduki , Kutalpara.	1470	3675	Lokhra
	Boko	Boko	Narenga, Alekjuri, Pairenga, Jarisatra, Bhehua, Kaithpara, Bondapara, Khatajuli, Sakhati-I	550	1375	Boko, Gobardhana,
	Bangaon	Bangaon	Niz Bogai, Nilaghat, Ouphula, Phalaphang, Choudhurypara, Tarabari- I, Tarabari- II, Chatabari, Lakadubi, Ranibhitha.	370	925	Beltola
	Rangia	Rangia	Bishenella, Halikuchi, Kekohati, Khoponikuchi, Tulsibari, Jaljali, Doloigaon, Balagaon, Septi Nakul, Bangalikuchi, Boangaon, Dahara, Maranjana, Bormurah, Balisatra, Lassi- Bishnipur, Sundhia, Kanikuchi, Baranghati, Bhaira, Dimu - I, Nakuchi, Bor Lechakona, Uttar Bordol, Dakhin Bordol, Gosain Solmari, Kachari Solmari	415	1245	
	Dimoria	Dimoria	Batakuchi, Kurkuria, Topatontoli, Ghagua, Belguri, Sagoligaon, Jhargaon, Goriaghuli, Mahmora, Urol, Erabari, Samota, Diksak, Rewamaheswari, Rewagaon, Dapata, Hirapara, Borobasti, Madhaya Malaibari, Keotpara, Barpak, Barghuri, Pub Malaibari, Ozari-1,2 &3, Gaon Dimoria, Niz-dimoria, Dhupguri, Bahtola, Na-kuchi, Borbitoli, Sitalkuri, Deulguri, Belguri, Khaloibari, Bhoregaon, Tegheria, Langchung, Latabari, Rajakhat, Lofar, Amguri, Dhemai, Fulung gaon, Moupur, Lahari, Luri, Bhumgaon, Laflong, Khulabari, Bhakua, Borkuchi, Rongdoloi.	2771	8313	Sonapur
	Chaygaon	Chaygaon	Batakuchi, Ratanpur, Phalaghat, Rehabari, Jogibari, Dakowapara, Patgaon, Borjhar, Khalbakhal, Moinapara, Ouguri, Hatigarh, Sanyasi, Bherbheri.	660	1932	Chaygaon
	56	**56**		**59390**	**155986**	**44**

Major Issues identified along the pig Value Chain

1. **Breeding Front**: Inbreeding depression, un availability quality stock, Poor private sector involvement in breeding, operation in villages are mostly in backyard. Production and productivity of the pig declined from 2007 census to 2012 census. It is observed that indigenous population declined by 25% but cross bred population increase by 9% during this period. This is due to severe inbreeding depression in the existing stock.
2. **Health Care Management**: Classical Swine fever is one of the most fatal disease prevailing in the state. Vaccine is not adequately available in the state. Other disease like FMD, Piglet anemia, worms etc. are also causing huge economic losses to the farmers. Health care service delivery system is not adequate. Skill of the farmers are also not updated.
3. **Feeding practices:** Traditional feeding practices with house hold extras/ waste, agricultural waste without computing in balance form. Little use of commercial feed mostly by bigger farmers only. Leads to very low productivity and low quality product. No basic Package of practice is adopted by the farmers except organized commercial farms.
4. **Operational management:** Pigs are mostly reared in backyard in the state without much attention on the housing. The prevailing practices of tethering, confinement on mud floor with or without shed and some time open range system of rearing influences disease occurrences, unhygienic environment, prevalence of vector born zoonotic disease like Japanese B Encephalitis, Systicercosis etc.
5. **Marketing front:** The pig market is operating mostly in traditional manner and confined to rural huts, street cornered shops in urban and peri-urban areas in the state. About 99% of total pork production is comes from the unorganized slaughterhouses without any value addition, without following slaughterhouse norms. Several public health issues are reported and animal welfare norms are violated by the butchers. There is no routine checkup facilities for such pork production system due to scattered back yard slaughtering of pig in the state. Here food safety is the major issued and creation of environmental pollution through indiscriminate disposal of waste to the open drain/ environment. Even it is reported that meat from dead and disease animals also sold in the market.
6. **Extension Services:** Extension network of the AHVD is not adequately active in the field to provide services at the farmers door step. The major laps is the infrastructures and logistics. Manpower is sufficient for required service delivery but facilities for animal husbandry extension services is very poor. Little attention on veterinary services are given by the existing network but animal husbandry part is totally neglected leads to stagnation in production and productivity.

Pig Value Chain & Price Discovery

SL	VALUE CHAIN PLAYERS	PRICE DISCOVERY
1	Producer/ Farmer	Rs. 95-100/ per Kg L.W.
2	Trader- Aggregator	Rs.110-115/- per kg L.W.
3	Trader- Butcher- Slaughterhouse	Rs.190-210/- per Kg pork
4	Processing houses (Processed Products Like Ham, Bacon, Sausages, Salami etc)	Raw pork-Rs 240/Kg, Smoke pork – Rs 350/Kg, Belly rolls-Rs 500/Kg, Boneless pork- Rs 320/Kg Value added products Rs 350-400/Kg
5	Whole sellers	Rs.215-225/- per kg pork
6	Retailers- Street cornered shop/ pork outlets/ Meat houses/ Malls	Rs.240-250/- per kg pork

Productivity Enhancement

Institution Building (Aggregation of Farmers): Up-scaling of trade volume: Identification Developmental Blocks as Cluster having maximum pig production.

The pig production in the state is mostly backyard family oriented operation, though the state is sharing the highest pig population in the country (16.13%). To compete with the emerging market situation, production volume, quality assurance, market competitiveness the cluster approach in production is the probable solution. The following interventions are proposed for formation of cluster:

- Identification of potential areas with considerable pig rearing population as production cluster
- Reorientation of existing clusters, Prioritize FIG formation (contact the promoting organization / engagement of service provider) in active participation of the Animal Husbandry & Veterinary Department.
- Sensitization of the clusters of a specified area for formation of FPO /FPC for commercial sustainability in long run operation.

The proposed cluster approach will increases the accessibility to scientific breeding and feeding practices resulting in attainment of optimum marketable growth of their pigs in minimum time. The cluster approach will also facilitate better bargaining power in both output and input segment which gives in remunerative price of produces and reduction in input cost. This will also helps in better access to the extension services, market information, technical backup. In cluster, involvement of women become more prominent due to vibrancy in social cohesiveness and the confidence building among them.

The FIG will consist of 10 pig rearing family member and it is assumed that about 1000 farm family will include per cluster. All together 56 cluster is identified for intervention with a range of farming families from 500 to 4500 nos per cluster on an average approx. 1000 pig rearing families per cluster.

Traceability:

To bring about transparency along the entire chain of pork production right from production, processing and retailing, maintaining traceability is utmost important. This is also very important in Food safety point of view as well as for keeping breeding records. Following activities are identified to maintain traceability..

- Procurement, Development and installation of MIS for online data management for registration, production, marketing and slaughtering.
- Procurement of data entry device - computer etc at data entry point (CSC of Cluster/FPO)
- Arrangement for cluster wise tagging and registration(procurement of Tag applicator, ear tags with UID, farmer's registration form/booklet),

Animal Husbandry & Veterinary Department will going to implement the programme for maintaining the tracebility of all categories of pig population viz, Fatteners, breeders, piglets so that the containment of the inbreeding depression through indiscreminate breeding practicing by the common farmers in the state. The record of immunization, deworming, Breeding activities, marketing, processing, food safety issues etc. can be monitored through this intervention. The pig bondhus in supervision of the local AHVD officials the project clusters will execute the programme. All the records will be entered into the MIS proposed to be developed under the project. Tablets/ Notepads will be provided with full fledged MIS enable software to be monitored at AHVD HQ level.

Market led production & climate resilient extension support

Pig rearing in the state is mostly a family oriented traditional operation to cater the need of the local market only. There is hardly any commercial approach exists in the state. In the face of changing time the newer generation farmers , both traditional and non traditional ones are gradually adopting commercial production with scientific management and better scale of operation. The traditional farmers have little knowledge on food safety, public health risk and zoonotic issues in pig rearing. To bring about the change, a market led approach in production is proposed with intervention on demonstration of climate resilience pig housing and management for climate smart production.

- Demonstration of climate resilient, pig sty for fatteners with manure management facility for minimizing GHG emission- Slated floor.
- Demonstration of climate resilient, pig sty for breeders with manure management facility for minimizing GHG emission- slated floor.
- Demonstration of low cost climate resilient Bokashi piggery
- Training of Farmers
- Organization of Field day

- Awareness generation on CSF, FMD, PRRS, Cysticercosis, deworming, min mix supplementation and zoonotic issues.

Adoption of demonstrated technology by the farmers will also helps in shifting from the small scale traditional way of production to commercially viable market driven approach with compliance of food safety norms. Community participation in the demonstration as a beneficiary contribution @10% of the total unit cost besides the land requirement for the purpose. The beneficiary selection will be carried out as per the selection criteria approved by the project, Local AHVD officials along with pig bondhus will implement the programme as per the technical guidance from NRC-P.

All total 56 Demo for Improved housing technology for fatteners, 56 for breeder and 56 on Bokashi piggery will be done during the project period in phase manner.

Feeding Management:

Judicious use of Feed staff for production enhancement: Estimation of nutritive value of the local unconventional feed resource & ration balancing

One of the major issues found during the Value chain analysis was that, the prevailing feeding practices practiced is not based on the scientific principles. Majority of the farmers feed their animals on the basis of locally available feed resources, irrespective of their nutritional value required for optimum growth and quality production. This imbalanced feeding practices leads to reduction in quality production and productivity. So the analysis of this nutritional gap is the need of the hour for proper supplementation of concentrate feed to augment the productivity both qualitatively and quantitatively. The following activities are proposed for judicial use of feed resources and production enhancement -

- Estimation of nutritive value of the local unconventional feed resource & ration balancing
- Awareness generation by training
- Demonstration of ration balancing
- Demonstration of improvising of food feed crops by minimal processing
- Training of Farmers
- Organization of Field day

The estimation of the nutritive value of the locally available feed resources will be carried out by NRCP and create a feed library and recommendation for computation of balance ration with the existing indigenous resources. They also recommend the nutrient gap for additional supplementation as an when required. The local AHVD officials and the pig bondhu will implement the programme as per the guidelines provided by the NRCP. The details of the feed library and ration balancing formulas will be fit into the tabs to be provided to pig bondhus and they provide the services at the door step with the help of the soft ware.

All total 56 demo will be done for 56 cluster during the project period on improvising food feed crops for pig feeding. Ration balancing demonstration and advisory services will be provided at door step of the farmers through Pigbondhu and the existing network of the AH

Formulation of policy for bulk procurement of Maize and other available raw materials at production site

Production of concentrated feed for pig is very limited in the state. The sustainability of feed production is lies on the bulk procurement of inputs. In Assam maize production is growing year by year and the maize is the major ingredient for feed. The maize production clusters can be linked with the feed processing houses through Agriculture Deptt/ ASMB and the bulk storage capacity of the ASWHC could be utilized for bulk storage near by the production centres.

- Liaising with ASMB & Agriculture Deptt
- Bulk Storage at ASWHC/ other Godowns

The linkages and procurement strategy of the maize and other ingredients required for the production clusters will be carried out in association with the AHVD, Agriculture Deptt and ASMB/ASWHC by the CSC/ FPO to be formed under the project.

Improvement of Breeding Practices among farmers for better productivity:

Establishment of Local Service Provider

Another major constraint distinctly observed during value chain analysis was dearth of quality breeding pigs in the state resulting reduction in productivity. Lack of heterogeneity in the existing gene pool leads to inbreeding depression, which requires prompt interventions to prevent further loss of the farmer. Breeding activities at cluster level by community boar management and introduction of AI with heterogeneous germplasm will go a long way in mitigation of this burning problem. Hence, the activities proposed under this project are -

- Awareness on breed up gradation and AI services
- Selection and training of a local AI worker at NRC
- Establishment of the Local AI worker (Equipments for AI)
- Introduction of community boar at cluster level with 6 month feeding & community exchange of boar every year.
- Record keeping for avoiding inbreeding at cluster level(CSC)

For door step service delivery, in addition to the existing setup of the AHVD, Pig bondhu (Local service provider) will be established within the community. A person with minimum qualification of HSLC passed having experience in pig rearing activities, willing to engage him/her as local service provider after going hands on training as per the requirement of the project. It is proposed that a pig bondhu will look after 50 FIGs under the cluster within a specified geographical area under the sole supervision of Local Block Veterinary officer.

AHVD & Service provider (NGO) will carry out the sensitization programme on breed upgradation & AI services for productivity & production enhancement in the cluster. All the records on breeding, production , healthcare and marketing will be recorded by the pig bondhu and the records will be incorporated in the MIS.

The pig bondhus will be a viable proposition provided an area of his service is having minimum 224 breedable sows for AI service and at least 500 fatteners produced in a year. The pig bondhu can earn and amount of Rs.8000/- per months from the AI service as well as other basic Animal Husbandry services at farmers door step.

Evidence generation for supporting pig breeding policy for the state of Assam:

The use of superior pig genetics - coupled with appropriate pig management practices in relation to pig health-care and feeding – can result in marked increases in both pig productivity and household income from pig keeping. One key enabler to this is a supportive policy on pig breeding and (if relevant) conservation. We will support the development of a pig breeding policy through: synthesizing relevant evidence on the impact of different options for improving pig genetics; assessing current pig breeds, cross-breeds and systems and recommending improvements; assessing need for germplasm and recommending options for obtaining; providing guidelines for development of a breeding policy and assist in formulating a policy; build capacity and develop materials to assist strategy implementation and monitoring. For this, we will follow the approach we have successfully used to assist in development and adoption of a pig breeding policy for the state of Nagaland, as well as the policy advice we have provided for stakeholders in Vietnam and Uganda.

ILRI has recently drafted a pig breeding policy for the state of Nagaland which has been approved by Govt. of India and the state government has recently accepted it. The same process is proposed to be followed for drafting the policy for the state of Assam. Accordingly AHVD has initiated the process to form an expert committee constituted of AHVD, NRCP, AAU, NBGAR and ILRI. The committee will be responsible for drafting the policy. The policy should reflect the need and interest of wide range of stakeholders that will be assessed through several consultations at block level, district level and state level. The finding of the consultation will be documented and produce as a background policy document. The policy would also consider the existing infrastructure and manpower resources and need of the infrastructure, manpower, capacity and financial resources to implement the policy. The policy would also taken into consideration of emerging challenges of climate change, international trade, trans boundary diseases etc. The policy will be first drafted by the expert committee which will be reviewed time and again in consultation with the top bureaucrats, entrepreneurs, service providers, traders, processors, smallholder producers, feed manufacturers etc. Finally, the Ministry of Agriculture, Govt. of India and National Bureau of Animal Genetics Resources (NBGAR) will be requested to review the policy so that the proposed policy does not conflict with any existing policies of GoI or NBGAR.

Production of Breeding Stock: Operationalization of the newly constructed Pig breeding Farms of the AHVD as Nucleus farm for seed development with exotic germplasm

To introduce heterogeneity in already deteriorated gene pool, a quality nucleolus breeding stock must be maintained in a scientifically managed breeding farm to supply breeding animals. The breeding animals will be supplied to the Multiplier farms for production of piglets to the farmers. The newly constructed Pig breeding farms of AHVD at Kothiatoli and Morigaon may be strengthened with induction of pureline exotic breeding herd.

- Induction of exotic germplasm in Morigaon and Kothiatoli pig farm as nucleus herd
- Operationalization of existing pig breeding farms under AHVD as multiplier farm under PPP mode.
- Establishment of linkage (registration, training, insurance, health coverage) of private breeders with the multipliers and nucleus farms of the department.

Mentoring managers of government pig breeding farms

A training needs assessment for government pig breeding farm managers and based on this develop a tailored, blended-lending course (that is, a course combining face-to-face and e-learning) and development of a mentoring program to support farm managers and meet their needs for technical backstopping. This will include guidance on breeding strategy implementation and reporting. It is also proposed to organize an exposure visit for the concerned government officials to Vietnam where pig system is growing rapidly.

ILRI will facilitate a study tour for pig production stakeholders (livestock production and animal health officers and farmer representative) in Vietnam to expose them to the Vietnamese pig industry. ILRI will also bring Vietnamese pig breeding experts to Guwahati to advise breeding policy. This will build on the very successful 2009 South-South dairy symposium which brought key dairy stakeholders from Assam to Kenya and the study visit of pig sector stakeholders from Nagaland to Vietnam in 2016.

Induction of Community Boars

Crossbred community boars will be inducted in to an area in 1 boar : 10 female ratio for upgradation of the local breeds for improved productivity. This will also bring about heterogeneity in the local gene pool. The community boars of different locality will be interchanged in a regular intervals to prevent inbreeding depression. Some of the breeding boars will be supplied from the multiplier farms strengthened under the project and some of the boars will be sourced initially from outside the state. The progressive farmers with sufficient facilities to maintain a boar willing to rear a boar and contribute @ 20% as his share against the cost of the pureline boar can be selected for the community boar programme. The farmer will charge fee against the natural services @Rs.300/- per service or as deem fit.

Establishment of AI Services at farmers door step

NRC Pig has already initiated AI of Pig with liquid semen in a cost effective manner with a simple technology which can be adopted even by a farmer after training. As the state has acute shortage of quality breeding boars, the AI can be a very timely and viable option for increasing market led productivity of the farmers. Initially some AI workers will be selected one /cluster and trained in NRC for AI service delivery and provided with the inputs for conducting AI in his respective area. The semen will be sourced from NRC initially. Some satellite semen collection centers will be established in the project districts to minimize the cost of transportation and facilitating easy availability. The cold chain required for the storage of the semen will be provided in the CSCs. The AI service provider or PIG BONDHU will cater the need of their area from those CSCs which in turn get the semen from the satellite semen collection centers.

The pig bondhus will be a viable proposition provided an area of his service is having minimum 224 breedable sows for AI service and atleast 500 fatteners produced in a year. The pig bondhu can earn and amount of Rs.8000/- per months from the AI service as well as other basic Animal Husbandry services at farmers door step.

Implementation of performance recording system at Nucleus herd, Multiplier & farmers level

For effective conduction of any breeding programme a performance recording system is a must. The proper record maintenance is mandatory both in Nucleolus herd (having the exotic parent stock) , Multiplier farms as well as in field level. This will help in addressing the major prevailing issue of inbreeding depression in the field.

It will also help in maintaining traceability in the entire production line. An MIS for the purpose is proposed which can record the data from field AI(with ear tag or farmer code), production at multiplier farm and Nucleolus farm level. The data of each cluster will be fed in the system installed in CSCs to be maintained in a common server. The sale of piglets through the CSC will also be recorded in the MIS which will link up the production data with marketing to provide perfect traceability.

Initially NRC pig will provide liquid semen to the breeder till the satellite centres are functional. The existing breeding farms of the AHVD could be incorporate with semen collection and processing facilities in due course of time for production of liquid boar semen so that the availability of the semen can be maintained locally. The CSC will be provided with the facility for preservation of liquid semen and the Pig Bondhu as well as the AHVD personnel will deliver services for insemination as per the requirement. In setting up of CSC, there will be 20% contribution from beneficiaries.

Establishment of Satellite centre for liquid boar semen processing

Existing liquid semen laboratories of the AHVD laying unused since long in different district after introduction of frozen semen in the state for cattle upgradation. Out of these 6 nos of laboratories are proposed for upgradation for liquid boar semen processing in different zones for local requirement. The existing staffs of the Labs will be trained at NRC pig for the purpose and breeding farms of the Deptt. will be strengthened for rearing of boar and semen collection. Laboratories at Demow ICDP, Baghchung Jorhat, Biswanath chariali, Kokrajhar, Khanapara, Manja ICDP laboratory are proposed for development of liquid boar semen processing & distribution centre under the project. Breeding farms of the Deptt. as well as some pvt. Breeders will maintain required breeding boars nearby locations of the laboratories for semen production.

Market led Extension Support:

Establishment of common service centre (CSC):

Establishment of common service centre (CSC) will provide extension support to the cluster through locally available input services. It will provide a common platform for the farmers of the clusters to avail breeding facilities, assess to concentrate feed at cheaper price and feed grinding facility of locally available ingredients, cold storage facility for vaccines as well as pig semen, cold storage for meat and meat products, weighing facility, a small multipurpose meeting chamber and facility for market information services. It will facilitate the transfer of technology for customized production of pig to fulfill the nature of market demand. The CSCs may also provide linkage for financial support and insurance facilities to the farmers within the clusters. The CSCs will also have facility for data entry device with operator for maintaining the cluster level information. CSCs will also provide a common site for farmers gatherings for any social issues. CSC will be operate by FPO. Initial activities for the clusters will be operated directly from the existing network of the AHVD till the FPOs are fully functional.

Following components for CSC are proposed under the project to achieve this objective.

- Creation of facility for AI with provision for semen storage.
- Identifying the local service provider.
- Establishment of godown for feed & medicine
- Cold chain for preservation of vaccine, meat & meat products etc.
- Creation of weighing facility for live animal
- Computerization for data entry of registration, trading, production and slaughtering.
- Low cost slaughter house.
- Feed grinding facility.
- Construction of mini multipurpose meeting hall

Market Development: Identification of Livestock market to be designated / re-designated for development of infrastructure in collaboration with Assam State Agricultural Marketing Board

The livestock & meat markets in the state are not developed as per the standard requirement. Though some amount of aggregation is done in the existing markets , it is done by the individual farmers only, not from a systematic clustered approach with significant volume of the trade. Moreover, the meat markets are mostly open air operation and the traders and consumers are not at all bothered about meat hygiene and food safety risk. This is due to lack of awareness crippled with insufficient infrastructure. To address these problems the following interventions are proposed under the project especially the markets deals with pork marketing:

- Identification of market to be designated / re-designated where pig/ pork traded in a big way and can be linked to major production clusters with significant marketable volume.
- Infrastructure development of the pig/ piglet and meat market especially pork market (Holding Shed, Drainage and waste management infrastructure, running water supply provision, Public toilet facility, internal & outside road linkage, ramp for loading & unloading of animals, and pork vending platform type market shed with flyproof netting.)
- Optional facilities for a low cost slaughter hall in the markets closely situated with the production cluster.
- Electronic weighing machine/platform, Computerization with digital display ,

The above interventions will create a conducive marketing environment in which food safety issues can be addressed properly and the public health hazard will be reduced considerably. It will also expected to establish better price discovery mechanism for the producer along with remunerative price for the traders and quality assurance on pork for the consumer.

Linkage with High Volume processing houses with Input & Output Chain

Facilitating linkages and contract with high volume processing houses to the input chain(production clusters through CSCs) and vendors for sale of hygienic pork & pork products in the market. This will provide sufficient scope for development of a consistent significant volume of input supply to processing houses as well as development of fair market for growth of hygienic meat as well as public awareness on safe pork. Additionally in urban & peri urban markets, establishment of meat vending cubicles with required amenities for trained vendors.

Hassle free transportation: Facilitation for obtaining Livestock transit permit for traders.

It is observed that the marketing cost of pig as well as pork is always found inflated due to involvement of hidden cost during transportation. This leads to the increase the consumer cost as well as results decrease in the profit margin for the traders/ producer. To address this issue Facilitation for licensing and liaising with Transport authority is proposed under the project so that hassle free transportation of the pig and pork can be achieved with proper transit permit. This will directly impact in the profit margin of the traders as well as the producer and also consumer can get in a cheaper price. Providing insulated van to prominent production clusters on need basis can also be considered under this project to facilitate scientific transportation of the meat & meat products from low cost slaughter house to the retailers.

Capacity Building of vendors for transformation from road side vending to licensed hygienic pork vendors. Training of the vendors by ToT developed by NRC so that increase demand for clean pork from the structured meat shop can be obtained and also to alleviate the social status of the pork vendors. Monitoring of the trained vendors by peer group to review the adoption of standard operational practices as per FSSAI norms so that the facilitation for licensing could be done.

Processing and value addition:

The provision of a scientific slaughter house and the facility of humane stunning method, step by step slaughtering, primary and secondary processing(value addition), packaging and proper transportation of the products in insulated transportation to the retailers are some of the pressing need indicated by the value chain analysis. Moreover the importance of a scientific backward linkage from production to the slaughter house is also equally important for production of marketable quality meat and meat products to comply the FSSAI norms. So activities in those line enlisted below are proposed under this project which will not only satisfy the market requirement but also satisfy all norms of the public health.

a) Identification and assessment of low cost processing houses / central large scale slaughter houses with primary and secondary processing facility.
b) Organization and establishment of the backward linkage from producer to processing house through a cluster approach
c) Strengthening of the transport facility to carry live pigs from clusters to processing houses – supply of transport vans to CSCs as pr need basis of the cluster populations.

d) Strengthening of selected centrally located processing house to meet the FSSAI norms - Facilitation for aggregation, linkages with the production cluster for ready raw materials in an un interrupted supply chain.

e) Organization of the forward linkage from processing house to retailers - Establishment of Linkage from the processing house to the retail outlets and super markets etc.

f) Maintenance of cold chain - Procurement of insulated van for transportation of meat and meat products from processing house to the retailers and arrangement of deep freezers to selected retailers dealing large volume of meat & meat products in regular basis.

g) Facilitation for Export - Facilitation of the Processing houses for obtaining Export License.

Assam livestock and Poultry Corporation will take lead for the post harvest value chain of the pig subsector through organization of production clusters for aggregation in bulk for organized buyers through CSC/ FPO established linkages with the large processing house as well as the low cost slaughterhouses. Establishment of low cost slaughterhouses at selected markets and at CSC linked to local cluster linked market will be carried out by the Corporation in technical collaboration with the NRC-Pig. It is proposed that 38 Low cost slaughterhouse at CSC level and 15 cluster linked selected market will be established in phase manner so that the primary processing of pork can be done in a hygienic manner by compliance of FSSAI norms.

Assessment of knowledge, attitude and practices (KAP) of value chain actors and economics of current business operation

Motivation and capacity strengthening of pig value chain actors are important to increase productivity, reduce transmission of diseases, improve pork quality and safety, and to increase consumers' satisfaction and demand for pork. To make the motivation and capacity strengthening programme more target group specific, need based and user friendly, it is important to understand the prevailing knowledge, attitude and practices (KAP) of market actors and to compare the same with the required/ standard KAP practices. The difference will indicate the knowledge gap that we are to meet. Therefore, it is proposed to conduct a KAP survey to assess the training need and make training more context specific, need based and outcome oriented. The study would also assist in the designing the training implementation plan by supplying information on preferred time, venue, motivating factor, expected output of the target groups. In addition, the findings would help to determine the performance indicators in term of knowledge, attitude and practices that could be verified at the end of the project by repeating the same baseline.

Tools for peer evaluation of training program pork food safety

The benefits of training fade unless there are systems in place to reinforce good practices. To this end, training will be monitored at two levels. Knowledge and attitude will be assessed before and after training and intermittent monitoring will be continued six months for ensuring adoption of improved practices. The second level of monitoring will be more intensive and action oriented. Towards this, immediately after training, a Pig/Pork Monitoring Committee (PMC) will be constituted among the trained actors to monitor the adoption of improved practices taught in the training by the fellow farmers/ traders/pork retailers using a simple monitoring tool to be developed by ILRI. This will be a simple tool to assess adoption of practices in terms of 'Yes' or 'No' and if 'Yes' what is the degree of adoption (ranked 1-5). The monitoring committee will monitor fellow members at least once monthly and submit the results to the project officials for second level of monitoring and verification using the same tool. Project officials would take action as needed and the process would be repeated several times in a span of six months. All successful adopters will be awarded with a training certificate in a ceremonial distribution event to be attended by senior government officials as a mark of appreciation and honour to the successful trainees. The list of trained value chain actors would be forwarded to Municipal Corporation/ FSSA for issuing (or renewing) trade license/registration. List of all trainees with contact details and photograph will be advised to record and keep in hard and soft forms for future use.

Strategic approach & Action Plan:

The increasing demand for animal source foods in the state and in the region generally associated with current low productivity of the pig population suggests that a well-targeted intervention to improve pig production could deliver significant livelihood benefits for traditional and other marginalized groups in the region. To make them well organized and to increase volume of the production and marketing it is proposed through collective approach and

thereby helping the farmers to obtain better price realization for their produce. It is proposed through APART for intervention in this sector covering 1.59 lakhs pig population with following strategies:-

- **Increased production through genetic improvement** of indigenous pigs through selective and crossbreeding – Induction of heterogeneous germplasm on cluster approach.
- **Address the issues related to feed shortage** and improvement of nutrient utilization for enhancing pig production-Ration balancing of locally available feed materials and production area specific low cost concentrate feed and production quality improvement to meet the market requirement.
- **Development of integrated pig health management Programme**- Pulse immunization of the pig herd against CSF & other diseases & regular deworming practices.
- **Post harvest management and value addition** of pork-Introduction of low cost slaughterhouses, linkages of production clusters with modern processing houses, modern pork vending outlets, transformation of the vendors.
- **Promote environment friendly and climate resilient pig farming**- Demonstration and adoption of climate resilient pig housing technology with improve manure management practices.
- **Promoting entrepreneurial development** in forward and backward front of pig production-Incentivizing the entrepreneurs to take up sectoral enterprises like feed production, meat processing & marketing, commercial pig breeding & fattening.
- Address the much needed issue of **Food safety** as per FSSAI norms from production, processing and value addition, cold chain maintenance upto retailing. Assessment of contaminants and residues in pork and formulate a standard SOP for reduction in pork for human consumption.
- **Knowledge, attitude & practice gap analysis** of the all the value chain actors, customized designing of training content for capacity building and massive awareness programme on good production practices & food safety along the value chain.
- Formation of **Farmer Producer Organization (FPO)** in production clusters to undertake the various activities in group basis and organized way which is difficult to perform by an individual farmer

Annex C1.3.1 (a) District & Block wise estimated Nos. of MPI/ DCS under Formal Milk Sector

Districts	Developmental Blocks	Estimated number of villages to be covered for organising MPIs/DCS by Yr-7 of APART (Nos.)	Estimated number of dairy farmers to be covered by Yr-7 of APART (Nos.)
Barpeta	Gobardhana (Part)	20	900
	Mandia	44	1980
	Bajali	31	1395
	Bhabanipur	36	1620
	Jalah (Part)	5	225
	Chakchaka (Part)	12	540
	Pakabetbari	18	810
	Chenga	7	315
	Barpeta	9	405
	Ruposhi	6	270
	Gomaphulbari	8	360
	Sarukhetri	2	90
Sub-Total	**12**	**198**	**8910**
Goalpara	Jaleswar	19	855
	Lakhipur	13	585
	Kharmuza	15	675
	Balijana	15	675
	Krishnai	17	765
	Matia	5	225
	Kuchdhowa	13	585
	Rongjuli	31	1395
Sub-Total	**8**	**128**	**5760**
Nalbari	Tihu (Part)	4	180
	Pachim Nalbari	4	180
	Barkhetri	16	720
	Pub Nalbari	5	225
Sub-Total	**4**	**29**	**1305**
Kamrup	Chandrapur	9	405
	Dimoria	7	315
	Rani (Part)	7	315
	Rangia	2	90
	Hajo	8	360
	Chaygaon	9	405
	Chayani Barduar	3	135
	Chamaria	1	45
	Bezera (Part)	3	135
	Rampur	2	90
Sub-Total	**10**	**51**	**2295**
Morigaon	Mayang	7	315
	Mairabari (Part)	14	630
Sub-Total	**2**	**21**	**945**
Nagaon	Rupahi	22	990
	Pachim-Kaliabor	1	45
	Bajiagaon	5	225
	Laokhowa	5	225
	Juria	7	315
	Batadraba (Part)	2	90
	Dulongghat (Part)	3	135
	Khagarijan	13	585
	Pakhimaria	4	180
	Raha	1	45
	Kathiatoli	4	180
	Binnakandi	12	540
	Jugijan	12	540
	Dhal Pukhuri	12	540
	Udali	1	45
	Kapili (Part)	1	45
	Lumding	6	270
Sub-Total	**17**	**111**	**4995**

Districts	Developmental Blocks	Estimated number of villages to be covered for organising MPIs/DCS by Yr-7 of APART (Nos.)	Estimated number of dairy farmers to be covered by Yr-7 of APART (Nos.)
Jorhat	Majuli	21	945
	Ujani Majuli	13	585
	Jorhat	11	495
	Kaliapani	1	45
	Titabor	10	450
Sub-Total	**5**	**56**	**2520**
Golaghat	Golaghat West	27	1215
	Golaghat North	3	135
	Kakodonga	11	495
	Golaghat Central	16	720
	Golaghat East	23	1035
	Morongi	3	135
	Gamariguri	6	270
	Golaghat South	4	180
Sub-Total	**8**	**93**	**4185**
Sivsagar	Demow	21	945
	Sibsagar	15	675
	Gourisagar	14	630
	Amguri	6	270
	Nazira	15	675
	Lakwa	1	45
	Pachim Abhoypur	4	180
	Sapekhati	4	180
	Sonari	3	135
Sub-Total	**9**	**83**	**3735**
Sonitpur	Dhekiajuli	3	135
	Gabharu	18	810
	Barchala	6	270
	Balipara	22	990
	Rangapara	2	90
	Naduar	7	315
	Chatia	13	585
	Bishawnath	15	675
	Baghmara	2	90
	Behali	4	180
	Chaiduar	4	180
	Pub-Chaiduar	2	90
Sub-Total	**12**	**98**	**4410**
Darrang	Khoirabari (Part)	3	135
	Goreswar	1	45
	Sipajhar (Part)	29	1305
	Pachim-Mangaldai (Part)	7	315
	Pub-Mangaldai (Part)	19	855
	Kalaigaon (Part)	4	180
	Bechimari (Part)	15	675
	Dolgaon-Sialmari	9	405
Sub-Total	**8**	**87**	**3915**
Cachar	Kalain	1	45
	Silchar	3	135
	Sonai	6	270
	Barjalenga	9	405
	Tapang	1	45
	Narsingpur	11	495
	Udarbond	1	45
	Baskandi	4	180
	Palonghat	1	45
	Rajabazar	7	315
Sub-Total	**10**	**44**	**1980**
Total	**105**	**999**	**44955**

Annexure
Sub-Component: C1.4

Annex-C.1.4 (a): Animal Vaccination Calendar

Vaccine	January	February	March	April	May	June	July	August	September	October	November	December
FMD												
HS+BQ												
Theileria	Vaccine is not available for the prevalent species i.e., *Theileria orientalis*. Available only for *Theileria annulata* (not prevalent in State)											
Brucella	Vaccination to female calves of 3-6 months of age, once in lifetime											

Annex-C.1.4 (b) Training calendar of AHVD-Cross cutting areas in informal and formal milk sector

Component	Schedule	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dairy Informal sector													
Refresher Training for Gopal mitra (GM)	Following Launch of APART , already trained and functional GMs will be identified in the project areas and subsequently training will be provided	Earlier (AACP)Training module will be followed and ToT trained at BAIF ,Pune will be entrusted for the job											
Training for DCS members	Training will be imparted for 1 day per month for subsequent five months	This will follow the 1:10:4 approach (adoption of improved practices by at least 4 persons out of 10, i.e 40% adoptability rate) Training module to be prepared by ILRI covering the following topics 1. Housing and sanitation 2. Animal nutrition 3. Diseases and its control 4. Reproductive and mastitis management 5. Record keeping of herd and maintenance of Health Card.											
Training of paravets	Following Launch of APART , for overall monitoring and service delivery	Training module to be prepared by ILRI											

Annexure-C 1.5 (a): Value Chain Development Plan (VCDP)-Fisheries

Introduction

Fish is traditionally cultured in Assam. Every household has a backyard pond. However, commercial farming of fish in bigger ponds constructed by farmers has been initiated at certain locations in many districts. Locally produced fish is in high demand in the state. Fish in Assam is daily dietary item, easily digestible food and rich source of omega fatty acid. Fish and seed production as well its marketing are providing livelihood to thousands of people in the state. The state is rich in water resources and the demand of fish in neighbouring states is very high.

Culturable water area and fish production for last five years in select APART districts

Sl	Districts	Water Resource (ha)			Fish Production (MT)				
		Ponds & Tanks	Beels	Total	2011-12	2012-13	2013-14	2014-15	2015-16
1	Cachar	6670	3359	10029	18150	18920	20350	21050	23023
2	Goalpara	1732	6820	8552	7334	7650	7880	7660	8380
3	Dhubri	3009	6999	10008	16598	13350	13600	15130	15760
4	Kokrajhar	1124	955	2079	3193	3761	3911	4100	4320
5	Kamrup	3503	1418	4921	19392	19729	20350	22150	22630
6	Nalbari	2845	2248	5093	9026	10200	10800	11340	11940
7	Barpeta	3976	6299	10275	15635	16416	16550	17230	19730
8	Darrang	6387	5959	12346	7547	11273	12000	10050	10485
9	Sonitpur	2157	7032	9189	7002	7205	7984	8160	8595
10	Nagaon	7187	9919	17106	24263	26184	27030	29610	31485
11	Morigaon	1744	8299	10043	10990	11250	13650	13950	14290
12	Jorhat	1177	6298	7475	13010	13200	13170	13720	14245
13	Golaghat	1080	2600	3680	8578	8750	9300	8510	8860
14	Sivasagar	1549	3878	5427	9610	9800	10190	11260	11850
15	Lakhimpur	1996	6499	8495	12140	12315	12350	12350	13330
16	K.Anglong	1550	60	1610	2200	2260	2280	2220	2310
	Total	**65532**	**100815**	**166347**	**243871**	**254270**	**266700**	**282700**	**294200**

Identification of Clusters And Baseline Data

Fish farming even though is practiced in every nook and corner of the state, there are concentration of activities with involvement of a large number of farmers, both for fish seed and fish production at certain locations. These pockets with water spread area of 50 ha and having considerable marketable surplus and influence in market arrivals have been identified for value chain development under APART.

During the last phase of implementation of AACP-AF, 10 Farmers' Producer Organizations (FPOs) were formed, 5 in each of the districts of Nagaon and Sonitpur by Deloitte Touche Tohmatsu India Pvt Ltd, New Delhi, which was engaged as a Consultant by ARIAS Society, Government of Assam. The FPOs with total of 4112 farmers who were members of the 10 societies were subsequently registered under Assam Co-operative Societies Act, 2007 (Act IV of 2012). As the project was coming to a close, no supportive activities could be taken up by the FPOs.

Details of base line data of fish clusters identified for project interventions is given below:

District	Sl	Name of Cluster (Block)	Pond fisheries			Beel fisheries			Annual fish production (7 + 10) (ton)	Seed production particulars			
			Water Area (ha)	Farmer (no)	Annual Fish production (approx) (ton)	Beel (no)	Area (ha)	Annual Fish production (ton)		Hatchery (no)	Seed Grower (no)	Water Area (ha)	Seed production Fingerling (Million)
Barpeta	1	Pakabetbari	198	500	630	2	143	64	694	0	5	2	0.0
	2	Mandia	400	1255	1240	3	40	13	1253	0	12	3	0.0
	3	Bhabanipur	920	2300	2890	1	50	23	2913	20	175	79	9.0
	4	Barpeta	126	546	405	1	10	4	409	1	24	12	0.6
Cachar	5	Borkhola	471	722	1180	1	28	13	1193	3	89	44	2.0
	6	Borjhalenga	405	810	1130	0	0	0	1130	1	110	26	0.5
	7	Tapang	260	400	750	1	15	6	756	0	6	2	0.0
	8	Sonai	53	350	140	2	55	23	163	0	90	14	0.0
Darrang	9	Bechimari	73	304	220	0	0	0	220	0	5	2	0.0
	10	Kalaigaon	60	475	170	0	0	0	170	0	3	2	0.0
	11	DolgaonSialmari	359	1080	1150	0	0	0	1150	1	4	3	0.6
Dhubri	12	Mankachar	101	312	310	2	100	45	355	0	5	2	0.0
	13	Gauripur	89	310	260	6	96	39	299	0	7	2	0.0
	14	Bilashipara	86	249	250	1	30	17	267	0	3	1	0.0
	15	BirsngJaruah	64	237	160	7	214	75	235	0	6	2	0.0

District	Sl	Name of Cluster (Block)	Pond fisheries			Beel fisheries			Annual fish production (7 + 10) (ton)	Seed production particulars			
			Water Area (ha)	Farmer (no)	Annual Fish production (approx) (ton)	Beel (no)	Area (ha)	Annual Fish production (ton)		Hatchery (no)	Seed Grower (no)	Water Area (ha)	Seed production Fingerling (Million)
	16	Rupashi	55	181	190	1	70	33	223	0	4	2	0.0
Goalpara	17	Lakhipur	217	496	700	5	30	14	714	1	5	2	0.4
Golaghat	18	Morangi	98	92	340	1	16	8	348	1	7	2	0.5
Jorhat	19	North West Jorhat	117	459	330	9	172	76	406	1	8	4	0.5
Kamrup	20	Hajo	526	1292	1750	7	124	53	1803	16	30	13	7.0
	21	Chumuria	140	350	470	3	82	33	503	1	37	20	0.4
	22	Dimoria	66	176	210	2	22	10	220	0	3	1	0.0
	23	BihdiaJajikona	90	200	290	2	25	10	300	0	2	0	0.0
	24	Garaimari	99	290	300	1	8	5	305	0	0	0	0.0
	25	Rangia	57	169	180	1	6	3	183	1	5	2	0.5
Kokrajhar	26	Kokrajhar	172	477	430	4	84	37	467	0	0	0	0.0
Lakhimpur	27	Karunabari	217	734	720	0	0	0	720	6	123	54	3.5
	28	Nowboicha	121	440	370	6	90	33	403	2	77	24	1.3
Morigaon	29	Moirabari	645	1040	2250	5	179	77	2327	5	34	8	3.8
	30	Dolonghat	519	1260	1820	5	180	51	1871	20	250	86	8.0
Nagaon	31	Binnakandi	253	365	890	2	50	14	904	24	126	45	12.0
	32	Lawkhowa	220	550	112	6	177	55	167	4	25	9	1.9
	33	Juria	390	650	1350	3	50	9	1359	3	120	52	2.1
	34	Rupahihat		1000	1400	4	80	15	1415	16	130	47	9.7
	35	Batadrava	1156	2557	4100	8	150	67	4167	43	220	72	20.6
Nalbari	36	Borkhetri	1034	1945	3200	5	136	75	3275	0	20	6	0.0
	37	Borigogbandhag	249	720	850	4	25	0	850	0	10	4	0.0
	38	Pub Nalbari	325	615	1100	5	79	4	1104	0	18	7	0.0
	39	West Nalbari	212	400	680	1	20	5	685	0	15	7	0.0
Sonitpur	40	Balipara	182	495	600	3	67	7	607	1	16	3	0.5
	41	Pub Chioduar	78	358	250	4	22	9	259	0	4	1	0.0
	42	Sootea	129	435	400	5	40	34	434	1	7	1	0.4
	43	Borchola	104	395	300	1	20	11	311	1	15	3	0.5
	44	Bihaguri	82	455	250	3	67	36	286	1	6	1	0.4
Sibsagar	-	Gourisagar	0	0	0	2	60	19	18	0	0	0	0.0
	-	Sivsagar	0	0	0	5	93	23	22	0	0	0	0.0
Total	**44**		**11628**	**28446**	**36717**	**140**	**3005**	**1253**	**37857**	**174**	**1861**	**667**	**86.3**

Fish Value Chain Actors and Activities

Actors	Input Supplier	Producer (Farmer)	Aggregator	Wholesale buyer / auctioner	Retailer	Consumer
Activities	Input supply	Production	Aggregation & transport to markets	Bulk buying, auctioning	Retailing	Consumption
Support Services	Transport	Extension, credit, transport	Credit (banking)	Packing, Transport	Transport	--
Location	Input market	Farm	Farm site	Wholesale Market	Retail market	Household

Mapping of Value Chain Actors, Market Channels and Distribution Network

Supply chain in fishery input and fish marketing is short and consequently the numbers of value chain actors are not very high.

Supply Chain: Input Suppliers> Fish Producers> Aggregators> Commission Agents/ Wholesalers> Retailers> Consumers

Input Supply: It is observed that in most of the cases, except supply of fish seed, all other input items such as feed, lime, inorganic fertilizers, growth promoters etc are dealt by single dealers. The seed retailers on a bicycle with aluminum hundi normally supply seed to the individual farm sites.

Most of the input dealers in the fish production clusters are small retailers and get their supplies from large distributors/dealers and not directly from the company. Majority of them maintain a data base of progressive farmers whom they use to supply inputs. Input dealers provide on shop crop advisory to the farmers for water quality management, disease control, pond productivity etc. free of cost. This is an indirect way of pushing their sales to the farmers. The major constraint faced by input dealers is the lack of capital for expanding the business like scaling up the operations/volumes at the same place. There is less support from bank for their business expansion.

Retail market prices of Fish farming input items

Sl No	Input	Unit	Rate (Rs.)
1	Lime (Quick)	Kg	15.00
2	Zeo-lite	Kg	80.00
3	Urea	Kg	8.00
4	Single Super Phosphase (SSP)	Kg	9.00
5	Muriate of Potash (MoP)	Kg	20.00
6	Di-Ammonium Phosphate (DAP)	Kg	31.00
7	Formulated Fish Feed (protein 25%)	Kg	30.00
8	Mustard Oil Cake (MOC)	Kg	28.00
9	Rice Polish (RP)	Kg	15.00
10	Growth hormones (no. of items)	Kg/litre	-
11	Feed supplements (no. of items)	Kg/litre	-
12	Medicines (no. of items)	Kg/litre	-
13	Fish seed (200 mm)	Per piece	8.00-10.00

Package of practices followed by Farmers

No specific and standard packages of practices (PoP) are followed by farmers in the clusters. The PoP developed by Assam Agricultural University (AAU), Jorhat/College of Fisheries (CoF), Raha in 1995 for semi-intensive farming with a productivity target of 3.5 t/ha/yr is not being followed by all farmers. They have modified the practice over a period of time. Further, in few cluster in few districts the farmers follow multiple stocking and multiple harvesting systems and getting better productivity of around 4 t/ha/yr.

The farmers are practically the main actors in the whole process as they are feeding the market and are the source of livelihood of all other actors. They produce fish with productivity range of 2.8 to 3.5 tons/ha/yr which can be doubled by following improved package of practices provided there is regular and timely flow of quality inputs to the cluster farmers and their technical and record keeping capacity are built up.

Output Supply**:** Fish from the markets are sold in the wholesale or retail markets within the district, and a part of it transported to the neighbouring districts, as well as to the neighbouring north-eastern states.

Producers invest in fish farming in the form of cash and labour and wait for return on the investment for 6-9 months, get hardly 55-60% of the retailers' price in fish value chain, as their share of revenue. On the other hand, the retailers are getting 30-35% of the consumers' price with minimum investment and that too just in a day, though his investment is only for (i) purchase of wholesale fish, (ii) transportation from wholesale market to retail market, and (iii) retail market toll. The aggregators and the wholesalers get a maximum of 15-20% of the consumers' price which is considered to be not a very high level considering the services they provide. The losers here are the producers and the gainers are the retailers.

Aggregators

As the co-operative marketing is not in practice in the clusters, fish from farmers (about 90%) are collected by aggregators and transported to wholesale markets. Limited farmers (about 10%) having higher production in bigger farms bring fish personally to the markets. Thus, the aggregators play an important role here.

Wholesale Buyer

Wholesalers fix the price through auction by loudly announcing the rates in kg by engaging an employee, normally called 'dakal' in the market. The wholesalers also extend finance to the producers to meet the cost of fish culture with assurance to supply fish to them in return.

Retailers

Retailers collect fish at auction price plus 10% of the same which they pay to the wholesalers. The retailers transport the fish to retail markets, add fish transportation cost, market stall commission and his profit and sell the fish to the consumers. The retailers are the major profit makers in the whole chain.

Market Intelligence Network System

The information network and delivery mechanism at present is functioning in its own design which is observed to be moderately effective. Farmers of the cluster have communication linkages with specific aggregators and specific wholesalers of specific markets through mobile phones. The main link functionary here is the aggregator who acts as a moderator between the producers and the wholesalers. However, there is enough scope for improvement of market intelligence network for effective marketing of produce. *Market intelligence* network of the

farmers is very weak. Input dealer and aggregator is the sole source of information for inputs and output respectively. However, fish traders get the information on prices in different markets through their business network and also through traders associations.

The input suppliers are the source of input price, which is very important to the producers. Large number of farmers are having mobile phone link with the input traders of the nearby market.

Information delivery on fish production and marketing issues through print media, TV, radio and Meteorological station is presently inadequate. Advance information on other issues like weather, precipitation, storm, flood, drought, etc., is very important, which affect production as well as marketing of the commodity to a considerable extent. Mechanism of information delivery on these issues is presently lacking and needs to be developed. Development of market intelligence network essentially needs detail study on every step of the value chain. It is one of the most critical phases of activities which needs detail assessment of the status at every stage of the value chain to identify the gaps and opportunities for intervention.

Price of fish at various levels of value chain is one of the indicators of the trend of the business at a particular time. This also guides the market players about movement of the commodity for better realization of price at other places. Price varies as per size/weight and species of fish. Table 5 below indicates price of important culturable fishes during the process of marketing at different levels of value chain in Nagaon district.

Price of important culturable fishes

Sl	Value Chain Players	Price discovery (Rs./kg fish)					
		Catla	Rohu	Mrigal	Silver carp	Grass Carp	Common carp
1	Producer	120-150	150-190	100-130	60-80	100-120	100-120
2	Aggregator	150-170	180-200	125-150	70-100	120-150	120-150
3	Wholesaler	170-190	180-210	140-160	90-120	130-170	130-170
4	Retailer	190-200	220-230	170-180	120-140	160-170	160-170

Quality & Its Attributes

Quality of fish brought to the markets from the clusters is considerably good. Quality deterioration generally does not occur because the fish are harvested from the ponds at late night and brought to markets within 1 - 2 hours of harvest to the markets. A good percentage of fish is brought live to the markets in special containers fitted on small four wheelers. Further, in retail markets also, the entire quantum of local fish landed in the markets is sold within a short time. Hence, in the case of locally produced fish, quality deterioration is not a major factor and hence the need for storing/preserving fish for next day's sale, has not been felt.

Critical Binding Constraints

Input Side:

Substandard products: Both fish seed and fish feed are of sub-standard quality and inadequate. Fish seed quality is bad both genetically as well as in its size. This is one of the important factors for low productivity in ponds. Further, most of the fish farmers depend on admixture of traditional feed made of rice bran/ rice polish and mustard oil cake both of which are also in high shortage. The quality of fish feed available (both locally available and imported from Bengal, Andhra Pradesh, etc., is also poor because of less protein content (20%) with poor/low food conversion ratio (FCR) than the recommended standard (25-30%). Further, quantum of formulated floating fish feed is grossly inadequate, which is another major constraint.

Poor performance: Inadequate technology transfer and extension support is another constraint hampering the expected increase in productivity and overall growth of the sector.

Output Side:

Marketing: Food safety issue is highly neglected now. There is almost no arrangement for quality check up of the commodity in the wholesale or retail markets. This is the mandate of AH & Veterinary and Health Department at present. However, as gathered, poor manpower strength of the Departments is hindering in taking up regular quality checking of market landings.

Market infrastructure: Market infrastructure in all fish markets linked to the 5 clusters is not at all healthy. There is no proper provision for water supply, selling booths (stalls), drainage, electricity, building etc. and mostly operating under open sky. This warrants construction of hygienic fish markets and their proper management.

Connectivity: The problem in the cluster is the poor road connectivity/bad road condition, absence of an appropriate mode of fish transportation and cooperative marketing. The outcome is the low margin of profit to the producers, from the sale of fish to the consumers.

Marketing cost:: The value or the costs added to the product during its transportation from producers to consumers is generally known as marketing cost. The Table-6 below indicates the general trend of value addition or marketing costs involved in major carp fish marketing in the selected clusters in the district.

Marketing cost by different market players

Item	Farmer	Commission Agent/Aratdar	Retailer	Total	Percentage out of total
Transportation	1200	-	500	1700	49.06
Basket handling	-	100	-	100	2.88
Icing	-	200	-	200	5.78
Wage / salary	-	100	-	100	2.88
Aratdar's commission	-	625	-	625	18.04
Tips/ refreshment, etc	-	625	115	740	21.36
Total	**1200**	**1650**	**615**	**3465**	**100.00**

It has been observed that the cost of fish transportation is the highest (49%) and the basket handling and wage/salary is the lowest (2.88%). The total value addition per quintal of fish stands at Rs.3465. Out of this, the Aratdar's value added cost is the highest (47.62%), while the retailer's value addition cost is the lowest (17.75%).

Expected Outputs & Outcomes

It is expected that the full project benefits, outcome and impact will be reflected in the cluster from third year onwards when large quantity of marketable surplus will be landed in the markets. A minimum period of three years may be required to have replication effect in the whole cluster area of the demonstration programmes. Table-8 below gives the anticipated outcome and output of APART.

Measures for addressing the Constraints, Output & Outcome

Measures for addressing the Constraints	Output	Outcome
• Establishment of Seed Multiplication Centre	Increased availability of quality fish seed	Regular supply of certified fish seed
• Brood stock management with hatcheries	Quality improvement of brood stock	Improvement in quality of fish seed for higher productivity in farm ponds
• Polyculture technology development	Increased production in farm ponds	Productivity enhancement, more market landings
• Technology demonstration in beel fisheries	Increased production in beel fisheries	Availability of indigenous small variety fishes in markets, productivity enhancement, more market landings and improved community involvement
• Climate resilient Paddy-fish farming	Increased farm output of both fish and paddy through adoption of climate resilient farming practice, assured production	More market arrivals, assured productivity with select crop
• Establishment of CSC/ Single window kiosks • Sensitization & skill development programme	Easy availability of farming inputs	Increased and sustainable production, increased market landings
• Support for finance and insurance	Procurement of required level of input and introduction of mitigation measures for crop loss	Sustainable production and increased adoption of farming practices
• Better packaging and infrastructure support for marketing • Capacity building for hygienic handling & post- harvest management	Increased shelf life	Availability of hygienic fish to consumers
• Market intelligence including e-auctioning	Support farmers in decision making for crop selection, precaution in farm management, harvesting and marketing of produce ,	Scheduling of harvesting as per choice of producers/market demand, transparent and swift disposal of product in market, price rationalization
• Development of hygienic fish markets • Provision for production of ice	Shelf life increase, proper waste disposal, and reduction in spoilage during	Ensuring food safety for consumers

Measures for addressing the Constraints	Output	Outcome
• Awareness on hygienic packaging and storage	transportation	
• Food safety surveillance		
• Intensification in implementation of legal provisions	Improvement in quality of fish seed, conservation of fish and fishery resources	Conservation of fish biodiversity

Activities Planned : Diversification & Market-led Climate resilient demonstration programmes:

(a) Market study indicated that demand for Rohu (*Labeo rohita*, 1-2 kg) and Catla (*Catla catla*, 2-3 kg) is comparatively high. Among other cultured fishes (minor carps), demand for Bata (Labeo bata) is considerable. There is also high demand for small varieties fishes like Mola (Amblypharyngodon mola) and Puthi.

(b) The project will take up demonstration programmes in farm ponds of the FPOs to show case the climate resilient market led production systems. The farming practices will generate considerable market surplus through enhancement of productivity from the present average level of 2.5 t/ha/yr to over 5 t/ha/yr. The forward and backward linkages for production and marketing will be coordinated through a Common Service Centre (CSC) to be established under the project in a suitable location within the cluster.

(c) It is envisaged that to meet the objectives, best practices followed at national and international level will be adopted under the project. State level POPs developed by College of Fisheries, Assam Agriculture University; National level POPs developed by ICAR institutes like Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar; Central Inland Fisheries Research Institute (CIFRI), Barrackpore and International practices suggested by organizations like World Fish, Malayasia are taken into consideration for this purpose. Further, the practices will also focus on technologies suggested by World Fish for climate resilient aquaculture, consumers safety etc.

(d) The farm ponds of the farmers in the cluster for taking up demonstration programme will be identified as per project selection criteria. The capacity of the selected farmers will be built up through short duration training on climate resilient production and marketing systems. Exposure visits to suitable places will also be arranged for the farmers to make them fully aware about better practices taken up elsewhere.

Action Plan: Strategy, activities and time line

Sl	Strategy	Activities to be taken	Time Line (Year)
1	Seed quality improvement	Establishment of Seed Multiplication Centre (MC):	2018/2019
		Brood stock management with improved hatchery	2018/2019
2	Demonstration on production technology	Polyculture technology demonstration	2018-2023
		Climate resilient Paddy cum fish integration	2018-2023
		Technology demonstration in beels	2018-2023
		Pig-fish integration demonstration	2018-2023
3	FPO formation and establishment of Common Service Centres/ formation of Fish Producer Groups (in line with CIG of AACP)	11 new FPOs will be formed and 10 FPOs formed under AACP (5 each in the districts of Nagan and Sonitpur) will be strengthened. 13 CSCs will be established, eacg covering 1500 sq ft.. In rest of the 29 clusters where there will be no FPO, FPGs will be formed with NGO support as per new guideline	2017
4	Credit linkage/ insurance coverage workshop	Will be taken at CSC level	2018-2020
5	Capacity building of farmers	Short duration training of farmers at farm level/ CSCs and exposure visit	2017-2022
6	Field Days	Seeing is believing programme at farm site of demonstration farmers for adoption/fellow farmers on application of farming practices and day of harvesting	2020-2023
7	Awareness camps		2017-2022

Note: 1. Market development under Comp B-2

2. Road improvement within clusters and clusters to markets under Comp B-2

Details of Implementation Programme::

a*. Establishment of Seed Multiplication Centre (MC)*: Seed multiplication centre will be established under Government sector with all required infrastructure. The centre will procure pure strain seed of Jayanti Rohu, Gift Tilapia etc from outside the state and produce quality seed for distribution to hatchery operators for raining the seed into future brood stock. Seed collected from river Brahmaputra will also be reared in the MC for the same purpose. The activity will provide scope for quality brood supply to the hatchery owners and help them produce better quality seed for fish farming in the district/zone.

b. *Brood stock management with improved hatchery*: Suitable private sector hatcheries will be identified as per selection criteria and necessary infrastructure will be developed with sharing of fund by beneficiary as well. The improved method of brood stock management along with seed production technology will be applied here. The practice will be demonstrated to all hatchery operators in the districts/state for them to be followed up subsequently for quality seed production and distribution to fish farmers for increased fish production.

c. Polyculture technology demonstration and Climate resilient Paddy cum fish integration: Demonstration of climate resilient farming practice of high yielding compatible fish species will be taken up in selected farmers' pond to increase productivity upto over 2 times of present level with project target of minimum 5 tons/ha. This will lead to increased market landings. The produce will be value added in the common service centre before sending to the market which will give better price to the producer.

d. Technology demonstration in beels: Technology demonstration in beel fisheries by combining indigenous small fish secies (e.g. mola) with Indian carps supported with stock enhancement, stock improvement and habitat management/improvement will be taken up. This may lead to production enhancement to 2-3 times of present level of 0.50 -1.0 ton/ha/yr.

e. Pig-fish integration*:* Pig-fish integration is a highly profit making farming practices where input for fish farming is not required. This practice is traditionally followed generally in tribal areas. The demonstration programme will motivate the farmers to adopt improved practices for high return and also encourage neighbouring farmers to adopt the technology. The package will provide yield 4 tons of fish per ha and 4 tons of meat from pig farming.

f. ***Credit linkage/ insurance workshop*:** Credit and insurance support to fish farmers are very poor in the state. Large numbers of farmers in the clusters are in need of operational cost to procure fish farming inputs. About 50% of them approach the wholesalers for credit support and the wholesalers use to extend the same on the condition that the farmers are to sell fish to them. Consequently, the farmers have no other option of selling fish elsewhere which might provide them to get better price. Further, poor insurance support to fish stock, fishery assets like ponds, equipments etc sometimes cause considerable loss to farmers.

The CSC will therefore organize workshops with bankers and insurance personnel and farmers which will provide scope for interaction between them and help the farmers get support from banks/ insurance agencies to meet their needs.

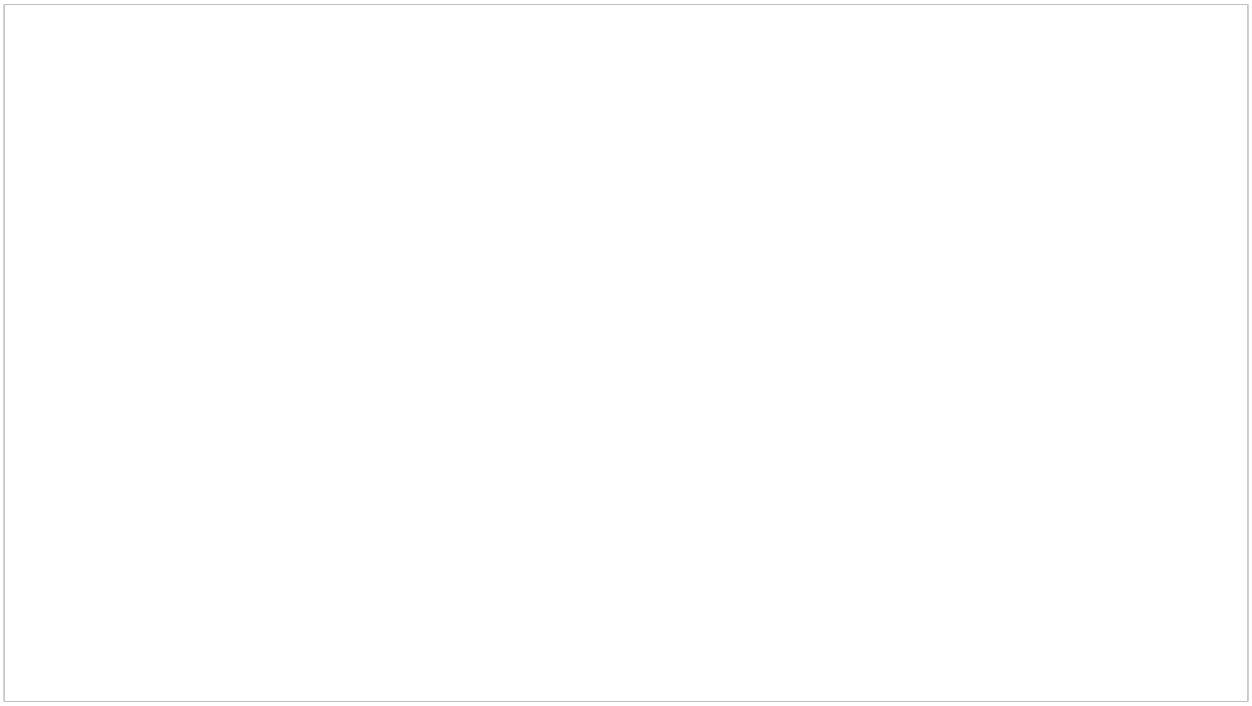
g. Capacity building (Training/ workshop/ Field days/ awareness programmes: Technology transfer to farmers in suitable manner is one of the most important tasks for farmer's adoption. Special effort will be made under the project to make farmers aware about different farming practices to increase productivity and value addition. Short duration training for beneficiary and adoption farmers/ workshop will be organized. In addition, field days will be organized on the day of sample netting and harvesting of beneficiary ponds to show the benefit of improved farming practices to the neighbouring non-beneficiary farmers in and around the clusters. This will motivate them for adoption of new technologies.

Activities with physical targets

Sl	Activities	Unit	Physical Target
1	* Establishment of Seed Multiplication centre	no	4
2	Brood stock management with improved hatchery	no	15
3	Polyculture	ha	1200
4	Technology demonstration in beels	ha	2225
5	Climate resilient Paddy cum fish integration	ha	500
6	Pig-fish integration demonstration	ha	500
7	Credit linkage/ insurance workshop	no	100
8	Field Days	no	400
9	Awareness camps	no	500
10	Capacity building -training & exposure visit of farmers		
i	Direct beneficiary farmers	no	9400
ii	Adoption farmers	no	3750
11	Value addition		
i	Fish processing (units)	no	10
ii	Aeration to fish transportation van	no	100
iii	Ice manufacturing units to CSCc	no	13

** Seed multiplication Centre will be taken up centrally in suitable Govt. farms*

Thirteen (13) Common Service Centres (CSC) are proposed to be established in the clusters. The objective of setting up of the CSCs is to function as a small business entity to support forward and backward linkages to the FPO farmers for sustaining their production and marketing functions.



Annexure
Sub-Component: C2.1

Annex-C.2.1 (a): District wise CSCs & FPOs on Agri. & Horti. Sector

District	Nos. of Blocks(Clusters) Involved	NOS. of FPOs	NOS. of CSCs
Barpeta	3	3	3
Cachar	3	3	3
Darrang	4	4	4
Dhubri	3	3	3
Goalpara	2	2	2
Golaghat	3	3	3
Jorhat	3	3	3
Kamrup	2	2	2
Karbi-Anglong	1	1	1
Kokrajhar	1	1	1
Lakhimpur	3	3	3
Marigaon	1	1	1
Nagaon	5	5	5
Nalbari	2	2	2
Sivasagar	2	2	2
Sonitpur	5	5	5
Total	**43**	**43**	**43**

Annex-C.2.1 (b): District wise CSCs & FPOs on Fishery sector

District	Blocks(Clusters) Involved	Nos. of FPOs	Nos. of CSCs
Barpeta	2	2	2
Cachar	2	2	2
Darrang	1	1	1
Kamrup	1	1	1
Marigaon	1	1	1
Nagaon	3	3	3
Nalbari	2	2	2
Sonitpur	1	1	1
Total	**13**	**13**	**13**

Annex-C.2.1 (c): District wise CSCs & FPOs on Piggery (Pork) sector

District	No of Block involved	Nos. of FPOs	Nos. of CSCs
Barpeta	1	1	1
Darrang	2	2	2
Goalpara	4	4	4
Jorhat	3	3	3
Kamrup	5	5	5
Karbi Anglong	5	5	5
Kokrajhar	2	2	2
Lakhimpur	1	1	1
Morigaon	1	1	1
Nalbari	1	1	1
Sivasagar	6	6	6
Sonitpur	7	7	7
TOTAL	**38**	**38**	**38**

Annex-C.2.1 (d): District wise CSCs & FPOs in Handloom & Textile sector

District	Blocks(Clusters) Involved	Nos. of FPOs	Nos. of CSCs
Jorhat	1	1	1
Kamrup	1	1	1
Lakhimpur	1	1	1
Sivasagar	1	1	1
Sonitpur	1	1	1
TOTAL	**5**	**5**	**5**

Annex-C.2.1(e): District and Block wise break up of CSCs & FPOs on Agri. & Horti. sector

District	Block	Commodity	Area (Ha.)	Production(Mt)	Nos. of CSC & FPO
BARPETA	Chackchaka	Potato	225	2199.38	1
		Pea	150	171.3	
		Cauliflower	75	2615.83	
		Lentil			
		Rice			
	BHAWANIPUR	Potato	500	4887.5	1
		Maize	150	473.4	
		Lentil	150	108.9	
		Tomato	95	2439.13	
		Rice			
	PAKABETBARI	Potato	460	4496.5	1
		Rice			
Total					**3**
CACHAR	BORKHOLA	Brinjal	100	1290	1
		Cabbage	80	1389.36	
		Cauliflower	80	997.92	
		Tomato	80	1831.6	
		Rice			
	PALONGGHAT	Potato	450	3242.7	1
		Pumpkin	80	1506.64	
		Brinjal	80	1032	
		Rice			
	UDARBAND	Pumpkin	120	2259.96	1
		Potato	120	864.72	
		Cabbage	60	1042.02	
		Rice			
Total					**3**
DARRANG	BECHIMARI	Cauliflower	788	25133.26	1
		Cabbage	777.33	15640.72	
		Pea	468	491.87	
		Maize	376.67	1052.41	
		Rice			
	DALGAON-SIALMARI	Maize	960	2682.24	1
		Cabbage	810.67	16311.42	
		Cauliflower	745.33	23772.41	
		Tomato	432	4422.17	
		Banana	163.33	2389.57	
		Potato	160	1453.76	
		Rice			
	PACHIM MANGALDOI	Maize	906.67	2533.23	1
		Black Gram	306.67	163.15	
		Mustard	306.67	181.85	
		Tomato	230.67	3943.48	
		Cabbage	180	3621.78	
		Potato	180	1635.48	
		Rice			
	SIPAJHAR	Maize	1146.67	3203.79	1
		Mustard	793.33	470.45	
		Black Gram	673.33	358.21	
		Potato	520	4724.72	
		Cabbage	160	3219.36	
		Tomato	86.67	1322.09	
		Rice			
Total					**4**
DHUBRI	BIRSING JARUA	Black Gram	850	642.95	1
		Maize	175	467.25	
		Lentil	150	158.55	
		Rice			
	CHAPAR-SALKOCHA	Mustard	460	415.38	1
		Rice(Special)	112	316.96	
	NAYERALGA	Black Gram	1615	1400.205	1
		Rice			
Total					**3**
GOALPARA	JALESWAR	Brinjal	113.33	1503.48	1
		Cabbage	73.33	1227.16	
		Cauliflower	53.33	785.87	
		Rice			
	RONGJULI	Banana	120	2338.32	1
		Rice			
Total					**2**
GOLAGHA	PADUMONI(	Potato	617.6	4687.58	1

District	Block	Commodity	Area (Ha.)	Production(Mt)	Nos. of CSC & FPO
JORHAT	DHEKORGORAH DEV. BLOCK(North West Jorhat)	Brinjal	330.667	4617.76	1
		Cabbage	200	4134.4	
		Cauliflower	200	3154	
		Pumpkin	156.67	3186.6	
		Potato	118	866.36	
		Rice			
	MAJULI DEV. BLOCK	Mustard	880	698.72	1
		Potato	796.67	5849.13	
		Black Gram	679.33	235.73	
		Rice			
	UJANI MAJULI DEV. BLOCK	Black Gram	1200	416.4	1
		Mustard	1200	948.4	
		Potato	486	3568.21	
		Cabbage	80	1653.76	
		Cauliflower	80	1261.6	
		Rice			
Total					**3**
KAMRUP	BOKO	**FPO formed during AACP**			1
		Summer & Winter Paddy, Ginger, Joha Rice			(Name of FPO & Village-Sarbo Unnayan Samobai Samitee, 68 No Boko,)
		Banana	53.33	581.44	
	HAJO	Potato	355	3894.53	1
		Cauliflower	66.67	1638.47	
		Cabbage	66.67	1013.2	
		Brinjal	53.33	1271.84	
		Tomato	53.33	1991.09	
		Rice(Glutinous & Joha)	20	29.87	
Total					**2**
KARBI-ANGLONG	LUMBAJONG	Ginger	52	555.72	1
		Maize	51.33	191.01	
		Rice			
Total					**1**
KOKRAJHAR	KOKRAJHAR	Potato	84.93	846.62	1
		Tomato	68	567.44	
		Cauliflower	53.33	810.29	
		Rice			
Total					**1**
LAKHIMPUR	BOGINADI	Potato	556.67	8820	1
		Rice			
	KARUNABARI	Cabbage	400	8270.4	1
		Ginger	400	3124.8	
		Brinjal	300	6279.3	
		Banana	200	3289	
		Cauliflower	200	3153	
		Potato	172.8	2592	
		Rice	466.67	994	
	NAOBOICHA	Potato	326.4	4896	1
		Brinjal	100	2093.1	
		Rice			
Total					**3**
MARIGAON	MAYONG	Mustard	1240	668.36	1
		Potato	371	1872.44	
		Maize	360	593.28	
		Brinjal	286.67	6153.59	
		Banana	133.33	2644.13	
		Rice			
Total					**1**
NAGAON	BATADRAVA	Potato	484.87	3027.5	1
		Maize	281.07	703.51	
		Cauliflower	194	4800.14	
		Brinjal	147.46	3289.39	
		Banana	110.8	1980.439	
		Cabbage	53.33	820.91	
		Rice			
	JURIA	Potato	529	4765.58	1
		Maize	110.8	277.33	
		Cauliflower	75.6	1870.57	
		Cabbage	72.4	1114.38	
		Rice			
		FPO formed during AACP period			
	KALIABOR	Summer &			1

District	Block	Commodity	Area (Ha.)	Production(Mt)	Nos. of CSC & FPO
T	EAST GOLAGHAT DEV. BLOCK				
		Mustard	93.33	41.44	
		Tomato	136.66	3238.31	
		Rice			
	BOKAKHAT	Mustard	1151.2	663.34	
	(GOLGHAT WEST DEV. BLOCK)	Black Gram	1052.09	681.76	1
		Potato	374	2838.66	
		Pea	370	474.34	
		Rice			
	KAKODONGA	Ginger	326.67	2930.2	
		Pumpkin	213.33	5237.33	1
		Mustard	197.33	87.62	
		Pea	165.33	1240	
		Rice			
Total					**3**
	BARKHETRI	Potato	796.67	5166.38	1
		Lentil	210	140.91	
		Tomato	147.33	5032.46	
NALBARI		Maize	138	423.66	
		Brinjal	112.67	1321.13	
		Onion	99.33	461.9	
	PACHIM NALBARI	Rice	900	2134.8	1
Total					**2**

District	Block	Commodity	Area (Ha.)	Production(Mt)	Nos. of CSC & FPO
		Winter Paddy,Brinjal,Cabbage,Cauliflower, Potato			(Name of FPO & Village- Tubukijarani Panchgram Krishak Cooperative Society Ltd.Tupukijarani, Tupukijarani Gram Panchayat)
		Potato	314	2828.72	
		Brinjal	86.67	1933.27	
		Rice			
		Banana	112.27	2006.65	1 (Name of FPO & Village- Bhurbandha Seuj Krishi Unnayan Samobai Samitee Bhurbandha Gram Panchayat)
	LAOKHOWA	Potato	289.33	2606.51	(Name of FPOs & Villages- Bogamukh Krishi Unnayan Samobai Samittee, & Annapurna Krishi Samobai Samittee ,Bogamukh)
		Cauliflower	127.07	3144.01	
		Brinjal	86.93	1939.22	
		Cabbage	130.13	2003.01	
		FPOs formed during AACP			
		Summer & Winter Paddy,Brinjal,Cabbage,Cauliflower, Potato			
		Summer & Winter Paddy,Brinjal,Cabbage,Cauliflower, Potato			
		Potato	185	1666.6	1
		Banana	57.6	1029.54	(Name of FPO & Village- Lakahanabandha Seuj Krishi Unnayan Samobai Samittee,Lakhanabandha)
		FPO formed during AACP			
	PACHIM KALIABOR	Summer & Winter paddy,Mustard,Cauliflower,Brinjal			
Total					**5**
	GAURISAGAR	Potato	390	1799.59	1
		Mustard	200	116	
		Tomato	50.67	787.56	
SIVASAGAR		Rice			
	DEMOW	Mustard	200	116	1
		Cabbage	53.33	921.6	
		Tomato	50	787.56	
		Rice(Joha)	110	231	
Total					**2**

District	Block	Commodity	Area (Ha.)	Production(Mt)	Nos. of CSC & FPO
SONITPUR	BALIPARA	Mustard	664	459.16	1
		Ginger	130	1261.65	
		Maize	125.33	649.23	
		Cabbage	104.67	542.17	
		Rice			
	BIHAGURI	Mustard	1121.73	775.68	1
		Potato	556	3955.38	
		Cauliflower	228.67	3346.54	
		Cabbage	114.67	2337.02	
		Rice	1293.6	2155	
	BORSOLA	Maize	720.67	3733.05	1
		Onion	160	762.4	
		Banana	102.67	1845.95	
		Tomato	88	2093.08	
		Rice	4060	7612.5	
	DHEKIAJULI	Mustard	930.13	643.19	1
		Potato	723.33	5145.79	
		Maize	125.33	649.23	
		Cabbage	92	1875.05	
		Tomato	82	1950.37	
		Cauliflower	78.67	1151.29	
		Ginger	50.53	490.43	
		Rice	2621.33	4915	
	GABHARU	Mustard	738.67	510.79	1
		Potato	578.13	4112.84	
		Cabbage	114.67	2337.02	
		Rice	1588.8	2979	
Total					**5**

District	Block	Commodity	Area (Ha.)	Production(Mt)	Nos. of CSC & FPO

Annex-C.2.1(f): District and Block wise break up of CSCs & FPOs on Fishery sector

District	Name of Cluster (Block)	Water Area (ha)	Farmer (no)	Nos. of FPO & CSC
Barpeta	Mandia	400	1255	1
	Bhabani pur	920	2300	1
Cachar	Borkhola	471	722	1
	Borjhalenga	405	810	1
Darrang	Dolgaon Sialmari	359	1080	1
Kamrup	Hajo	525.7	1292	1
Morigaon	Moirabari	645	1040	1
Nagaon	Dolonghat	519	1260	1
	Rupahihat	410	1000	1
	Batadrava	1156	2557	1
Nalbari	Borkhetri	1034	1945	1
	Pub Nalbari	325	615	1
Sonitpur	Balipara	182	495	1
Total		**7351.7**	**16371**	**13**

Annex-C.2.1(g): District and Block wise break up of CSCs & FPOs on Piggery sector

DISTRICT	Dev. Block	Approax Pig rearing family	Approx. Pig population	Nos. of CSC & FPO
Jorhat	Ujani Majuli	5750	14375	1
	Dekorgarha	320	800	1
	Majuli	4128	10320	1
Barpeta	Bajali	1195	2988	1
Lakhimpur	Narayanpur	850	2125	1
Morigaon	Bhurbandha	480	1200	1
Darrang	Pachim Mangaldoi	562	1852	1
	Sipajhar	453	1476	1
Sonitpur	Dhekiajuli	537	1343	1
	Balipara	818	2045	1
	NA Duar	823	2058	1
	Sakomatha	823	2058	1
	Baghmara	490	1225	1
	Bihali	512	1536	1
	Pub Chayduar	670	1675	1
Goalpara	Rongjuli	1418	4254	1
	Kuchdhuwa	462	1386	1
	Balijana	1385	4155	1
	Lakhipur	1091	3273	1

DISTRICT	Dev. Block	Approax Pig rearing family	Approx. Pig population	Nos. of CSC & FPO
Nalbari	Borigog Bongaon	364	910	1
Karbi Anglong	Bokajan	1185	2963	1
	Lumbajong	2372	5930	1
	Howraghat	3066	7665	1
	Rongkhang	585	1463	1
	Socheng	624	1560	1
Kokrajhar	Dotoma	1163	2908	1
	Gossaigaon	989	2473	1
Sivasagar	Khelua (Lakowah)	5793	16894	1
	Gaurisagar	693	1733	1
	Demow	1940	4850	1
	Disangpani (Sonari)	4533	11333	1
	Sapekhati	1182	2955	1
	Nazira	1771	4428	1
Kamrup	Rani	1470	3675	1
	Boko	550	1375	1
	Rangia	415	1245	1
	Dimoria	2771	8313	1
	Chaygaon	660	1932	1
Total		**54893**	**146749**	**38**

Annex-C.2.1(h): Illustrative infrastructure cost for CSC on Agri. & Horti.

Sl.	Items	Unit	Quantity/ Area	Unit cost	Amount (Rs. in Lakh)
1	Land*(land will be provided by members)	Ha	0.1	-	0
2	Construction of small office-cum-data entry room, storage for produce, inputs, space for machinery/equipment etc., mini meeting hall.	Sqft.	1500	0.009	14
3	Office furniture,office equipment , computer & accessories	LS			1.5
4	Hand pallet truck & weighing scale (electronic)	No	Hand pallet (2 nos.) & weighing scale (3 nos.)	Hand pallet @ Rs.0.10 per unit & weighing scale @ Rs. 0.10 per unit	0.5
	Total				**16**
*Land will be given by members					

Annex-C.2.1(i): Illustrative infrastructure cost CSC food grains, pulses, maize & oilseeds

Sl.	Items	Unit	Quantity/ Area	Unit cost	Amount (Rs. in Lakh)
1	Cleanin,sorting /grading plant machinery including stritching and bagging machine	Nos.	1	8	8
	Total				**8**

Annex-C.2.1(j): Illustrative infrastructure cost for CSC on Banana

Sl.	Items	Unit	Quantity/ Area	Unit cost	Amount (Rs. in Lakh)
1	Water Tank, plumbing & allied equipment		10000 litres	LS	1.00
	Total				**1.00**

Annex-C.2.1(k): Illustrative infrastructure cost for CSC on vegetables & ginger

Sl.	Items	Unit	Quantity/ Area	Unit cost	Amount (Rs. in Lakh)
1	Crates(collapsible),hand tools(knife scissor) etc.	LS			0.60
2	Steel tables(stainless)	Nos.	5	0.05	0.25
3	Misc.(plastic sheet, fumigation equipment, sprayer, tarpaulin etc,)				0.15
	Total				**1.00**

Annex-C.2.1(l): Illustrative infrastructure cost for CSC on Fish

Sl.	Items	Unit	Quantity/ Area	Unit cost	Amount (Rs. in Lakh)
1	Land (from community)	Ha	0.25	-	0.00
2	Construction of small office-cum-data entry room, storage for produce, inputs, space for machinery/equipment, mini meeting hall etc.	Sqft.	1500	0.009	14.00
3	Office furniture, office equipment , computer & accessories	LS			1.50
4	Digital weighing machine (500 kg capacity)	No	1	0.10	0.10
5	Crates		1000	0.005	0.50
	TOTAL				**16.10**

Annex-C.2.1(m): Illustrative infrastructure cost for CSC on Pork

Sl.	Items	Unit	Quantity/ Area	Unit cost	Amount (Rs. in Lakh)
1	AI servicing kit and related equipments	set	1	0.50	0.50
2	Construction of small office-cum-data entry room, storage for produce, inputs, meeting hall. (Rs.900/sq.ft)	Sqft.	800	0.009	7.20
3	Deep Freezer for Vaccine & a refrigerator	Nos.	1	1.50	1.50
4	Creation of weighing facility for live animal	Nos.	1	0.80	0.80
5	Establishment of low cost slaughterhouse	Nos.	1	3.50	3.50
6	Mini feed mill with Grinder & mixture	set	1	2.50	2.50
7	Provision for alternate power supply for cold chain maintenance (Solar/ DG set)	set	1	4.00	4.00
	Total				**20.00**

Annex-C.2.1 (n): Illustrative infrastructure & equipment cost for CSC on Handloom & Textile sector

Sl	Item	Units	Quantity/Area	Unit cost/Rate	Amount(Rs. In Lakh)
	STAGE -I FUNDING (20% benef. share)				
1	Land(from community)	Ha			
2	**Civil Cost**	**sqft.**	2500	0.01	25.00
3	**Machines and equipment**				
3a	**Quality Control**				
i	Lea strength Tester (Automatic)	Nos.	1	1.00	1.00
ii	Wrap reel	Nos.	2	0.25	0.50
iii	Weighing Balance	Nos.	2	0.10	0.20
iv	Light Fastness Tester (Fadometer)	Nos.	1	1.00	1.00
iv	Washing Fastness Tester (Laundrometer)	Nos.	1	1.10	1.10
v	AATCC Grey Scale (Change in Color)	Nos.	2	0.25	0.50
vi	AATCC Grey Scale (Staining)	Nos.	2	0.25	0.50
4	**PRE LOOM**				
4a	Warping drum (5 mtrdia, including creels, bobbins etc.)	Nos.	1	0.15	0.15
4b	Degumming kit	set	1	0.15	0.15
5	**DESIGN DEVELOPMENT**				
5a	**CATD**	Nos.	1	7.50	7.50
5b	Air Conditioning machine	Nos.	1	0.40	0.40
5c	Sample loom with jacquards	Nos.	1	0.25	0.25
	Subtotal (Stage-1)				**39.91**
	STAGE -II FUNDING (25% benef. share)				
6	**VALUE ADDITION SECTION**				
6a	Two roller calendaring machine	Nos.	1	5.00	**5.000**
6b	Embroidery Machine	Nos.	2	2.00	**4.000**
6c	Stitching machines	Nos.	2	0.25	**0.500**
6d	Interlocking machine	Nos.	2	0.1	**0.200**
7	**PACKAGING &FINISHING**				
7a	Enzyme washer	Nos.	1	0.8	**0.800**
	Subtotal(Stage-2)				**10.500**
	Grand Total				**50.417**

Annex-C.2.1 (o): MoA template for release of project grant to FPOs for creation of CSCs

(To be prepared and signed on a Stamp Paper)

Group photograph of the members

1. This Grant Agreement is made on the day …….. of …….. 20……, ……..…….District (Name of the project district) of Assam.

BETWEEN

2. …… (Name of the Farmer Producer Organization under …….. Cluster/Block), at …….. District (Name of the project district) of Assam, herein referred to as "First Party".

AND

3. Representative of District implementing agencies based at ATMA, herein referred to as "Second Party".
4. This agreement is drawn up for the purpose of releasing the grant for setting up of *Common Service Centre*, which will help the members of the Farmer Producer Organizations and the farmers as a whole from the project districts in post harvest management and market linkage for the project commodities.
5. Out of the total cost of setting up the Common Service Centres, initially……(percentage of the grant) will be borne by the First Party and……(percentage of the grant) will be the grant from the project to the First Party.
6. Terms and Conditions:
   - The First Party shall have to invest an amount of Rs……..(write in numbers) (Rupees…….. write the amount in words) as their initial share portion in the form of cash/kind on the activity.
   - The First Party shall have to produce documentary evidence of their investment and contribution from the members made on the activity to the Second Party.
   - Maintenance of the Common Service Centres established from the grant will lie with the First Party and will record the status of utilization of the centres in a log book on daily basis.
   - ATMA, Project Implementation Units of the line departments and Project Co-ordination Unit, ARIAS Society will have every right to monitor the utilization of the grant at any time and take action for illegal utilization.
   - Proper utilization registers will be maintained by the First Party and the Second Party will have every right to monitor and audit them.
   - Status of utilization of the assets created shall be provided to the second party by the first party regularly and when demanded.
   - Charging of user fees against utilization of the Common Service Centres lies at the discretion of the First Party
   - The First Party shall be liable for timely submission of Utilization Certificates and Statement of Expenditures along with the vouchers to the Second Party.
   - Any dispute between First Party and Second Party will be resolved amicably by the State Project Director, ARIAS Society, Khanapara, Guwahati-22.

Name and Signature of the First Party
(President/Secretary of the FPO)

Name and Signature of the Second Party
(PD ATMA)

Witnesses:

- Nodal Officer of the particular implementing department at ATMA.
- Signature of the Field Executives/Officers of the particular implementing Department.
- Two members from the General Body (one preferably to be women)

Annexure

Sub Component: C-3

Annex-C.3(a): Key particulars of the TOR for External Agency to conduct diagnostic study

1. OBJECTIVE:

The purpose of the survey is to have a baseline that can help design project activities aimed at increasing access to financial services for farmers and other value chain players and measure the impact of the project's support activities in the identified commodity value chains[31] in 16 identified project districts[32] in Assam.

2. SCOPE of WORK

Financial Instruments-Supply Side

a. To understand the financial instruments available for agro MSMEs, and including financial products available for start-ups, women led enterprises, youth-led enterprises, and other enterprises perceived as more risky. The size, maturity and other relevant parameters of this portfolio should also be indicated.

b. To document various value chain financing instruments available with financial institutions, and the further training needs for Value Chain financing instruments across different commodities. The size, maturity and other relevant parameters of this portfolio should also be indicated

c. To outlay the different financial players-Nationalized Banks/Private banks/CBOs/MFIs/Small banks in the rural space provisioning the financial instruments, for example – MSME financing and value chain financing instruments, in terms of penetration, outreach and quantity of portfolio disbursed.

d. To enumerate the access to such rural areas based financial instrument service mechanism/channels inclusive of the Branch/BC Models.

e. To present an analysis of the information on different schemes by central and state government for promotion of agriculture and agribusiness enterprises and different financial products devised to complement the schemes, either by government or by financial institutions.

f. To list the type of Credit Guarantee Funds available for the groups through center and state financial bodies and what are the gaps in using these funds. It would be analyzed through responses from some financial institutions and get real issues from the ground.

g. To map and understand the role of different financial / nonfinancial stakeholders and value chain players like, SIDBI, KVIC, , District Industry and Commerce Centers, Private sector players, NABARD, Banks, MFIs, Small Banks, and others in promoting the financial instruments.

h. To validate the unmet demands of the borrowers from the bankers' perspective.

i. To map the different insurance instruments – (especially crop insurance, cattle insurance, life insurance, health insurance and asset insurance) available with the sector catering the needs of the rural enterprises.

Financial Instruments-Demand Side

a. Types of financial products demanded by the small and medium enterprise owners; the availability of the products and the challenges faced by entrepreneurs.

b. Any specific support measures required by the start-ups, women led enterprises, youth-led enterprises, and other enterprises perceived as more risky (these could include additional training needs, measures to resolved lack of collateral, etc)

[31] APART focus commodities: cereals (rice, maize), pulses, spices and condiments (ginger, turmeric, mustard), fruits (banana), vegetables, livestock (pork, milk), fish and silk

[32] APART Districts: Undivided Nagaon, Undivided Sonitpur, Barpeta, Undivided Karbianglong, Undivided Kamrup, Undivided Dhubri, Golaghat, Kokrajhar, Lakhimpur, Darrang, Cachar, Undivided Sivsagar, Undivided Jorhat, Goalpara, Morigaon and Nalbari; Note undivided districts are as 1st April, 2016

c. To quantify the demand/readiness of financial instruments for enterprise promotion, especially with the borrowers in the Project blocks.

d. To characterize the population –producers, entrepreneurs, others who demand for different financial instruments and the reasons for the demand.

e. To enumerate the unmet demands from the perspective of the future borrowers.

f. To understand the insurance penetration (especially crop insurance, cattle insurance, life insurance, health insurance and asset insurance) among the community members.

g. To study the penetration of Warehouse Receipt financing in specified value chains, reasons for existing status and recommendation thereof.

Financial Education

To chart the current level of basic knowledge on how banks work, exposure to bank branches, ATMs, cash agents etc, awareness of simple financial instruments like bank accounts, savings, insurance, loan, Kisan Credit Card (KCC) etc and their benefits. Awareness on pre-requisites to avail these financial services. Variation in financial literacy levels due to differences in gender headship of households. Current level of financial literacy and credit counseling services being provided by public and private service providers and possible reasons thereof; Aspiration levels to avail financial services. Basic financial training, capacity building and counseling needs will be studied.

4. METHODOLOGY

The diagnostic study would be carried out in all 16 project districts as listed above and cover the value chains of cereals (rice, maize), pulses, spices and condiments (ginger, mustard), fruits (banana) and vegetables, livestock (pork and milk), fishery and silk. All the value chain players in each value chain will be studied. The sample size in each category of value chain players, along with support institutions to be covered will be shared by the consulting firm with client in the inception report which will be vetted by client. The draft questionnaires for each category of respondents will also be shared by the consulting firm with the client and will be finalised after client's concurrence.

District wise following commodity value chains will be studied

S. No.	District	Value chains to be studied
1	Undivided Nagoan	Rice, Vegetables, Milk, Maize, Banana, Fish
2	Undivided Sonitpur	Rice, Vegetables, Milk, Pork, Mustard, Ginger, Pulses (Blackgram & Lentil), Silk, Fish, Banana
3	Barpeta	Rice, Vegetables, Pork, Milk, Fish, Pulses (Lentil), Maize
4	Undivided Karbianglong	Rice, Pork, Milk, Vegetables, Ginger, Maize
5	Undivided Kamrup	Rice, Milk, Fish, Banana, Pork, Silk, Vegetables,
6	Undivided Dhubri	Rice, Maize, Mustard, Fish, Pulses (Blackgram, Lentil), Milk, Ginger, Pork, Milk, Vegetables
7	Golaghat	Rice, Mustard, Pulses (Blackgram, Pea), Vegetables, Milk, Silk, Pork, Ginger, Fish
8	Kokrajhar	Rice, Pork, Milk, Vegetables, Fish
9	Lakhimpur	Rice, Vegetables, Milk, Silk, Pork, Banana, Fish
10	Darrang	Rice, Vegetables, Mustard, Maize, Milk, Fish, Banana, Pork, Pulses (Blackgram)
11	Cachar	Rice, Milk, Fish, Vegetables, Silk
12	Undivided Sivsagar	Rice, Milk, Banana, Vegetables, Pork, Silk,
13	Undivided Jorhat	Rice, Milk, Silk, Pulses (Blackgram, Pea), Vegetables, Pork, Fish, Mustard
14	Goalpara	Rice, Pork, Milk, Silk, Vegetables, Fish, Banana
15	Morigaon	Rice, Vegetables, Pork, Milk, Pulses (Lentil), Mustard, Maize, Banana, Fish,
16	Nalbari	Rice, Vegetables, Pulses (Lentil), Maize, Fish, Milk, Pork

5. DELIVERABLES & TIMELINES

Deliverable 1: A preliminary report on the immediately available secondary information across the financial sector pertaining to the above said objective.

Deliverable 2: A clear consolidated report on the above said objectives with narration and analytical methods.

Timelines:

Activity	No of days from contract signing	Payment
Inception Report – with clear explanation of methodology, sampling and sample size for primary data gathering.	7	10%
Preliminary report based on secondary and sample primary data gathering	40	40%
Report presentation and submission	80	40%
Final report submission based on inputs from team	90	10%

6. ELIGIBILITY OF CONSULTANT FIRM

a. The consulting firm should have at least 10 years of experience in finance and microfinance sector.

b. Proven track record in financial assessment and management projects as well as sector specific experience in the sector- i.e. should have experience in delivering reports on agricultural enterprises, MSMEs and enterprise financing.

c. The firm should have a minimum annual turnover of Rs. One Crore in the last three years individually i.e. 2015-16, 2014-15 and 2013-14

d. Consulting firm may associate with other firms in the form of a Joint Venture (JV) or a Sub-Consultancy (with joint and several liability) to enhance their qualifications, however this shall be stated very clearly in the EOI and subsequent modifications shall not be allowed

e. Key professionals to be involved in the assignment would be evaluated as per qualifications and experience given in para below.

7. KEY PROFESSIONALS WHOSE CVs WILL BE EVALUATED

Sl.	Designation	Qualifications and Experience
1	Team Leader	A Post graduate in Economics/ Business Administration/ Finance/ Banking or a closely related field At least 15 years of relevant professional experience in banking/ microfinance/ enterprise financing/ rural financing. Should have experience in managing public sector projects in Agriculture/Agribusiness/Rural Infrastructure/Finance or closely related fields. Experience of working in World Bank projects is desirable.
2	Financial Inclusion Specialist	A Post graduate in Commerce, Finance, Micro-finance, Banking, Rural Economics, Development Economics, Rural Management, Development Finance or a closely related field At least 10 years professional experience in developing /emerging markets on financial inclusion/micro-finance/ rural finance development including five years in programs that included multiple financial sub-sectors either in a program management function or as technical expert.
3	Banking Specialist	A Post graduate in Banking/ Finance/ Economics/ Business Administration or a closely related field At least 10 years of relevant professional experience in the field of financial inclusion, retail banking, financial product design, rural credit, agri lending, microfinance or a closely related field.
4	Associate-Rural Finance/Enterprise Finance (2 nos.)[#]	A Post graduate in Business Management/ Rural Development/ Rural Management/ Entrepreneurship/Agribusiness/Commerce/ Finance/ Microfinance/ Economics/ Agricultural Economics/ Rural Economics or a closely related field. At least 5 years of relevant professional experience of working in banks, micro finance institutions, rural financing, enterprise financing, assessments or closely related disciplines especially in rural context in agri value chains and micro enterprises. Proficiency in the local language would be an advantage.

[#] Two CVs should be submitted for this position.

8. SERVICES AND FACILITIES TO BE PROVIDED BY THE CLIENT

a. Access to existing relevant documents/reports/data/background information etc about the project

b. Need based access to project areas, sites and concerned Government offices

c. No other services and/or facilities whatsoever will be provided by the client

Annex-C.3(b): Hiring of an agency for value chain financing product development

A. Scope of Work

1. The contracted Agency should develop the Innovative products for Value Chain Financing.

2. The Agency should follow the steps for development and launch of the product as illustrated below;

   I. Evaluation and Preparation Phase

      a. Analysed the Institutional capacity to undertake new product development

      b. Evaluate the 'product fit" with the institutions strategy and current offerings

c. Undertake the internal preparations to embark on the product development process

II. Prototype Design and Development

a. Undertake market research and client feedback
b. Design the initial product terms
c. Map out the operating logistics and processes
d. Analyse the human resource capacity
e. Verify the legal and regulatory compliance
f. Project revenues for the new product
g. Estimate costs to the institution and borrower
h. Finalize projections and the prototype

III. Pilot Testing

a. Define objectives of pilot testing
b. Define the parameters of the pilot test, including sample, location and duration
c. Prepare the pilot test site, including the systems, training and materials
d. Identify and collect information to monitor
e. Evaluate results of the pilot test and make decision on the launch of the product

IV. Product Launch

a. Develop an integrated marketing strategy refining the product design, pricing, placement and promotion
b. Develop an implementation plan including systems upgrades, staff training, and hiring (if required)
c. Launch of product

3. The Agency would cover this entire process in a period of 6 months.

B. Deliverables

Deliverable 1: A new product for Value Chain Financing in the project clusters

Eligibility of Technical Service provider

- The designated agency should have adequate understanding of the financial sector /enterprise/ rural financing and should have experience of handling such project of scale and scope earlier. Preference would be given to agency which have prior experience of working in Assam. The Agency should also have the infrastructure and proven track record of undertaking such work earlier.
- **Monitoring the contract**: The Committee comprising of the Agricultural Production Commissioner as the Chairman and with bankers shall be responsible for review and monitoring the progress of the work.

Annex-C.3(c): ToR for Financial Services Specialist

Qualifications: Post-Graduate/ Master's degree in Finance, Micro-finance, Banking, Rural Economics, Development Economics, Rural Management, Development Studies or a closely related field.

Experience: 11+years of professional experience in developing / emerging markets on financial inclusion/ micro-finance/ rural finance/SME finance development including five years in a program management function or as technical expert.

1. The FSS will support the implementation of project activities which aim to increase access to financial services for farmers and Small and Medium Enterprises (SMEs) underserved with financial services. These project activities related to financial services are primarily under two project sub-components: a) Support to Agribusiness Fund; and b) Access to and responsible use of financial services. The FSS would have primary responsibility of supporting and monitoring the activities under these sub-components, and a secondary responsibility of supporting and monitoring activities related to facilitating access to financial services for SMEs to be undertaken under the Enterprise Development and Promotion Facility (EDPF) sub-component.
2. The sub-components 'a' will be implemented by the Department of Industries and Commerce in partnership with a private Fund Manager. The FSS would be responsible for supporting the Government of Assam's representative in the Agribusiness Fund's advisory board in carrying out his/her responsibilities.

3. The sub-component 'b' will be directly implemented by ARIAS in partnership with two resource agencies/implementation partners contracted as Technical Service Providers (TSPs). The FSS will be responsible for enabling and monitoring the work of these TSPs.
4. The FSS will be responsible for supervising the work of consultants to be engaged by the project to undertake diagnostics, surveys and other studies to assess access and use of financial services by farmers and agribusiness SMEs. These studies are expected to assess the gaps in the existing financial offerings and devise suitable strategies to plug in those gaps.
5. The FSS will be responsible for representing the project or supporting others representing the project in key financial services stakeholder forums such as State Level and District Level Bankers Committees, and working with Lead Banks and other key financial service providers such as insurance companies and non-bank finance companies to facilitate increased access to financial services to project beneficiaries.
6. Monitoring and reporting progress all activities related to financial services to the SPD and other relevant stakeholders.
7. Any other related task assigned by the SPD

Annex-C.3(d): ToR for Technical Service Provider for Financial Education and Counselling

A. Scope of Work

1. The contracted Agency should select the members from the CIG which would act as Master Trainer's for the Financial Education and Counselling.
2. The Agency should provide comprehensive training on financial planning and financial products and services of the bank to them.
3. The MTs would provide comprehensive training on how to prepare budget diaries to the project clients and hand-hold them to prepare them. The training would also include sensitising the clients on the banking, insurance and pension products.
4. The MTs should make efforts to link the project clients with relevant financial products and services from banks, post offices or other financial institutions present in the area.
5. The MTs/Bank Mitras should liaise with the Financial Inclusion specialist at the district level as well as maintain a good relationship with the banks and insurance companies.
6. The Agency would ensure a digital capture of the budget diaries of the household which could be shared with the project clients so as to give them a snapshot of the financial health of the households. The data would be captured through tablets at the doorstep of the target clients and the data would be accessible through a web based app.
7. The Agency would cover this entire process in a period of 4 months.
8. This process would then begin in a new area.
9. The entire project area and target clients would be covered within two years of the contract being signed.

B. Deliverables

Deliverable 1: Financial Health Card for each target households. Target households engaged in basic financial planning.

Deliverable 2: A good knowledge both savings and loan products of the banks.

Deliverable 3: Opening of savings accounts for each target client. Having an insurance product for each target client. Preferable use of pension products.

Deliverable 4: Using the loans products of the banks judiciously and effectively.

C. Eligibility of Technical Service provider

- The designated agency should have adequate understanding of the financial sector /enterprise/ rural financing and should have experience of handling such project of scale and scope earlier. Preference would be given to agency which have prior experience of working in Assam. The Agency should also have the infrastructure and proven track record of capturing and handling the financial data of households through tablets at the doorstep

of the target clients. The data should be accessible through a web based app for the project staff as well as the target clients.

- **Monitoring the contract**: The Project Director of the APART shall be responsible for review and monitoring the progress of the work. A review committee may be constituted at State level to interact with the agencies and monitor the progress. The PD (or) his nominee will be the chairperson of the committee.

D. Services to be provided by APART:

- All relevant documents relevant to the specific projects;
- All available and relevant background documentation and studies (e.g. regional, sectoral, cumulative);
- Making all necessary arrangements for supporting the work of the Consultant(s), by e.g. facilitating access to government authorities and other Project stakeholders

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