Final Report

Value Chain Analysis of 6 selected crops covering 30 cluster areas

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National Agricultural Technology Program – Phase II Project (NATP-2)

Submitted to

Hortex Foundation

Strategic Partner of Department of Agricultural Extension (DAE)
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Grateful to you all

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IFAD
কৃষিপণ্য সংগ্রহ ও বাজারজাতকরণ কেন্দ্র
Commodity Collection & Marketing Centre (CCMC)

Abbreviations used in this report:

BADC	Bangladesh Agricultural Development Corporation
BARI	Bangladesh Agricultural Research Institute
BBS	Bangladesh Bureau of Statistics
BRRI	Bangladesh Rice Research Institute
CCMC	Commodity Collection and Market Center
CIG	Common Interest Group
DAE	Department of Agricultural Extension
DAM	Department of Agricultural Marketing
FGD	Focused Group Discussion
FY	Financial year
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GoB	Government of Bangladesh
Ha	Hectare
HACCP	Hazard Analysis and Critical Control Point
ICT	Information Communication Technology
ISO	International Standard Organization
KII	Key Informant Interview
LBF	Local Business Facilitator
MFI	Micro Finance Institute
MMC	Market Management Committee
MMT	Million Metric Ton
MOA	Ministry of Agriculture
MOU	Memorandum of Understanding
MT	Metric Ton
NATP	National Agricultural Technology Program
NGO	Non-Government Organizations
SAAO	Sub Assistant Agriculture Officer
Tk.	Bangladeshi Taka
ToR	Terms of References
UAO	Upazila Agriculture Officer
VC	Value Chain
WHO	World Health Organization

Executive Summary

Agriculture is the largest employment sector in Bangladesh. As of 2016, it employs 47% of the total labor force and comprises 16% of the country's GDP among this contribution of crops and horticulture sub-sector is 8.32% in national GDP in FY2015-2016. Bangladesh's agriculture is transforming from subsistence to commercial agriculture with higher level of inputs use and cultivation of different high value crops especially fruits and vegetables and market transformation. Safe fruits and vegetables can play a significant role in nutritional improvement, health improvement, employment generation, food and financial security of the people of Bangladesh through market diversification & good agricultural practices

Hortex Foundation intends to conduct value chain analysis of 6 selected crops covering 30 cluster areas under the project of "Development of value chain in Crop/Horticulture of National Agricultural Technology Program – Phase II Project (NATP-2)". Hortex Foundation is strategic partner of Department of Agricultural Extension (DAE) to increase the agricultural productivity of smallholder farms and improve smallholders' access to markets in selected districts.

The main objectives of the study were to (i) draw ~~a~~ value chain map for 6 selected commodities presenting all the relevant actors and their depth of relationship with one another (ii) identify main constrains throughout the value chains relating to post harvest technology, market access, agro-input supply, organization and management, finance, infrastructure, regulatory (policy) and quality control and (iii) make recommendation for value chain development.

The study was spread over 4 months to complete the assignment. The duration of the assignment is from 27 February 2019 to 27 June, 2019.

Both the primary and secondary data were used for value chain analysis Primary data were collected from CIGs farmers, members of the market management committee (MMC), inputs traders/ retailers, output traders, agro-processors, exporters and extension service providers, transporters, and others. CCMCs were observed and spot visits were made during ~~and~~ field surveys as applicable both for qualitative and quantitative information.

The **first step** of the assessment was review of secondary documents to selected value chain related information. Secondary data was extracted from GoB, BBS, DAE, DAM and other sources. The **second step was collection** of primary data including qualitative and quantitative information through PRA methods using formatted questionnaire, checklists, and value chain maps. Focused Group Discussions (FGD)-30, Key Informant Interview (KII)-40, and value chain mapping-6 were used for primary data collection. The **third step** was data entry, data consolidation, and presentation to Hortex. Data was validated and, feedback was received during the design workshop and the **final step** was to incorporate ~~d~~ comments, suggestions and feedback from sharing workshop and to finalize the report.

Findings of ~~from~~ field survey:
There are numbers of value chain actors involved in the selected value chain viz. producers (farmers), faria, paiker, aratder, wholesalers, processors, retailers, commission agent, inputs suppliers, transporters, packers etc. Among them farias bought 58% of the brinjal from farmers directly. Tomato, bitter gourd, sweet gourd and banana ranged from 40 to 46%. 40% of the bitter gourd was traded by Aratder. The Aratder also bought 39% of brinjal, 34% of tomato, 35% of sweet gourd and banana and 20% of rice directly The Retailers bought 3 products, namely sweet gourd, banana and aromatic rice, an average of only 7%. The Suppliers preferred 4 products, tomato, bitter gourd, banana and aromatic rice with an average percentage of 10% each. The farmers could market only 10% of tomato and 20% of aromatic rice to processors.

The home consumption of the products constitutes sweet gourd (2%), followed by brinjal and banana (3%). Bitter gourd (4%). Among the vegetables highest home consumption was tomato (6%). However, the highest home consumption of 10% was found in aromatic rice. Among the other buyers such as Faria, Aratder, Retailer, Retailer, Supplier and Processor the Farias bought the highest percentage (42%) of the products. The Aratders accounted for 34% of the sale. The retailers (7%), Supplier (8%) and Processor (5%) bought a low percentage of all the products.

Farmers Average Price to different VC actors
The value chain shows differential pricing depending on the market consumers. Price offer by the faria always less than other VC actors as they collect vegetables directly from the farmer's field or from their home. Afterwards faria do the grading sorting and transportation to the local or to the regional market even to Dhaka market. Except sweet gourd/ pumpkin, faria offers price more or less Tk.20 per kg at the farmer's level. During FGDs it was revealed that the price ranges from Tk10 to Tk. 32 per kg depending of harvesting season and supply in the market. It was also found that aratder offered little higher prices but farmers have to bring produces to their trading premises in the main market.

Pumpkin is little bulky, 3-5 kg per piece and may be sold by Tk.20-30 per piece. The highest return was obtained ~~for~~ from tomato (Taka 21/Kg) when sold to processor.

Place of Sales/Trade:
The sale of bitter gourd is 38% in farm, 11% at home and 51% at the market. Sweet gourd and banana are mostly sold from their farm, above 50%, around 30-38 % of brinjal, tomato and bitter gourd, none sold aromatic rice from the field'. around 11-20% sold from home. Farmers sold 51%in the local market of selected vegetables (brinjal, tomato, bitter gourd), banana 41%, and aromatic rice 77% used to sold in the market.

Cost of sales after harvest:
When sale was done in the farm, the cost ranged from Taka 0.86 to Taka 1.0/Kg. It amounts ~~1~~2 To 19% marketing cost. Sales from home had an added–of Taka 0.96 to Taka 2.20/Kg. The proportion of cost ranged from 19 to 25% depending on the products. The highest addition to cost was when products are sold to the marketers. The added cost was lowest for bitter gourd (Taka 2.92/Kg). In summary, on an average the cost of marketing at farm level was Taka 1.00, from home was Taka 1.00 and at the market was Taka 3.00.

Post-harvest value addition most products are made before bringing to the market. This enhances the keeping quality and attractiveness of the product and therefore increase the sale price. The activities were pre-cooling, washing, sorting, grading, treatment, drying, packaging and transporting. None of the products needed pre-cooling, any treatment or drying. The average cost of required treatment for brinjal was Taka 2.98/Kg, tomato Taka 3.2/Kg, bitter gourd Taka 2.92/Kg, sweet gourd Taka 3.1/Kg, banana Taka 3.3/kg and aromatic rice Taka 5.3/Kg. Of all the costs ~~of~~ transportation cost was highest, ~~(~~ranging from Taka1.38/Kg to Taka 2.21/kg), followed by packaging, ~~(~~ranges from Taka 0.78 to Taka 1.02/Kg.

Incremental Cost ~~among~~ VCs Actor
Faria ~~(~~purchased Brinjal from farmers~~)~~ at Tk.18/kg; paiker purchased Tk.20/kg from faria, aratder or large scale supplier purchased at Tk.23/kg, wholesaler in regional market or in Dhaka Tk.2 increases up to the Paiker level and Tk.23 in Supplier. From the supplier to wholesaler, there is a Taka purchased at 25/kg and retailer purchased from wholesaler/ aratder at Tk.27 and sold to consumer atTk.35/kg. There is difference in Taka10/Kg from farmer to wholesaler. An increase of Taka 11 was observed in tomato, 11 in bitter gourd, 10 in sweet gourd, 8 in banana and 25 in case of aromatic rice. A 10% to 25% increase in buying price was observed at the wholesaler's ~~end~~ of the value chain.
There were some costs associated along with the value chains. It includes handling, commission, logistics, facilities and transportation. However, in brinjal VC such cost was about Tk.9.6 per kg, in tomato Tk.9.8, in bitter gourd Tk.8.8, in sweet gourd Tk.9.1, in banana Tk.9.55 and in aromatic rice Tk.15 per kg.

Cost of Sales for value addition activities:
The total cost of all 8 post-harvest activities of each crop differed slightly. According to the VC actors it was Taka 4.93/kg for brinjal, Taka 5.08/kg for tomato, Taka 4.69/Kg for bitter gourd, Taka 4.71/Kg for sweet gourd, Taka 4.87/Kg for banana and Taka 5.05/Kg for aromatic rice. Most of the costs are related to transportation for all value chains

The Value Chain
Selected products (Brinjal, tomato, sweet gourd, bitter gourd banana and aromatic rice) have established market, and market chain. Usually producers harvest / pick twice in a week and sale in nearby market, or to the local traders called faria/ Paiker. Some time they sold from their field also. Local faria and Paiker sold to the nearby market to the regional large trader to Aratder. Aratder take some sales commission or some do trade themselves. Regional trader used to come from Dhaka or local trader also do the regional trade. These regional traders brought to Dhaka market (or regional large market) sale to another trader via another aratder. These traders may be large buyer to the retailer. Retailer sale direct to consumer. In Dhaka in between there are supplier who purchased brinjal from Aratder/wholesaler and supply to the super markets or to the restaurants. In every steps of the transaction there is transaction cost, grading sorting, transportation, profit/loss, other overhead e.g. labour, rent, commission etc. Those are selling to super shop usually do little more post-harvest work like cleaning, grading and sometimes packaging. Hence CCMC can take the market opportunity direct to supply super shops or large wholesale buyer.

Tomato
For tomato production cost per kg is Tk.7.7 in average sold in the market at Tk.17/kg to the local farias and finally consumer price went to Tk.34 per kg, where farmers shared 48% ~~cost~~ faria 6%, paiker 12%, local aratder 6%, wholesaler 3%, Dhaka aratder 6% and retailer 19%.

Brinjal:
Normal farmers share of consumer's price profit (54%) than anyone else in the value chain, producers are also adding value more 54%, faria 6%, paiker 4%, local aratder 3%, wholesaler 3%, Dhaka aratder 6% and retailer 19%.

Sweet Gourd:
In case of Sweet Gourd Farmers' share of consumer price is 47%, faria 8%, paiker 4%, local aratder 8%, wholesaler 4%, Dhaka aratder 8% and retailer 23%

Bitter Gourd:
In case of Bitter Gourd farmers share of consumer price is (53%). Retailer earned 22% profit with adding value 19%, faria and paiker get same profit 6% and added value 13% each. Dhaka level aratder and wholesaler also earn 6% profit with adding 3% value.

Banana
Various actors are involved in banana marketing. The principal actors include growers, Faria, Bepari, Aratdar, wholesalers, retailers and consumers. Faria are of different kinds. For example, some Faria do business without any running capital, whereas others do business with their own capital. The principal buyers of banana in the region are the Faria and Bepari. The growers generally bring their bananas in the assemble market, and sell either to the Faria or to the Bepari. There are two types of Bepari, local (50%) and the rest 50% from different markets like Dhaka and other cities/towns/divisions. The growers and the Bepari do not pay any toll/commission to the market committee.

Banana farmers are getting more profit (63%) than other VC actors in the value chain, producers are also adding value more 53%. Retailer earned 20% profit with adding value 15%, faria and paiker get same profit 7% and added value 5% each. Dhaka level aratder and wholesaler also earn 3% profit with adding 3% value.

Aromatic Rice:
96% of the produced aromatic rice was sold to the market especially to the local Faria (local level traders) only 4% farmers were kept for their own consumption. All of the producers sold personally as spot bargaining with local traders i.e. Faria and no group sales were found during the survey. So that VC strengthening intervention would be the right approach to boost the aromatic rice market and producer's income enhancement.

Employment engagement on post-harvest activities
The VC actors interviewed through KII gave their estimation as experienced on the labour requirement 8 post-harvest activities. The farmers, Farias, Aratder and Suppliers reported the engagement of 18 labourers for precooling and washing. The VC actors reported differential number of labour engagement for sorting; famers, Paiker and Suppliers view was 41, Farias thought 31 and Wholesalers and retailers stated 23 labour requirement for sorting Except for the Aratder statement of 59 labour requirement for grading all other VC actors stated the same number as that of sorting. The Wholesalers and Retailers stated the requirement of 23 labours for packaging whereas the other actors thought 52 to 53 labour are needed. In case of transportation the requirement of labour is the highest the numbers ranging from 46 to 114 person.

Producers' contact with VC Actors
At least 20 different actors exist in the value chain of farm products. Farmers have the highest and 100% contact with fertilizer dealers. Ninety-eight and 97% had contact with seed dealers/shops and pesticide dealers, respectively. A range of 81 to 97% farmers growing any of the 6 crops have contact with other (farmer to farmer). More than 80% of the farmers had contact with Aratder (81%), labour contracting groups (86%) DAE (UAO/SAAO) (88%), Farmers having a lesser than 80% contact are with Faria/paiker (79%), NGOs (78%), suppliers and power tiller owners (72%) and wholesaler. The contact with the pump owners was 61%. Fifty percent farmers had contact with local retailers and Banks. The least contacts of the farmers were with BARI scientists (59%).

Producers Contract with VC actors
There was no written or MOU and therefore no proof of contract. Farmers/producers went into contract farming with 13 different VC actors. Sixty percent of the brinjal farmers had verbal contract with pump owners, 63% with Faria/Paikers and 67% with Aratders. Fifty or more than 50% went into contract with fertilizer dealer (50%), pesticide dealer, labour contracting groups and Mahajans (53%) and power tiller owners (57%). The wholesalers, suppliers and seed dealers also came into contract with 40 to 47% farmers. The least contract farming brinjal producers (17%) went in contract with local retailers.

A high number of tomato producers (73%) went into contract with Farias and Paikers. Besides, 60% carried out contract farming with Aratder and Mohajans. In case of bitter gourd and sweet gourd producers a highest percentage (77%) went into contract farming with Farias and Paikers. However, the Aratders attracted attention of 80% of bitter gourd producers. A large proportion (70%) of sweet gourd farmers also went into contract farming with Mohajans. A highest percentage (63%) of banana growers carried out contract farming with Aratders, followed by 53% with Farias/Paikers

and Transport owners. The aromatic rice producers in the range of 73% chose the Farias and Paikers as their partners in contract farmers. Rice growers (53%) also went into contract with Aratder and labour contracting groups.

An overall average shows that VC producers preferred Farias/Paikers (69%) and Aratders (63%) for contract farming. Fifty percent preferred suppliers and Mohajans. A percentage of 41 to 42% of all producers went with seed, fertilizer and pesticide dealers.

Farmers' Depth of Relationship with VC Actors

The depth of relationship was expressed in percentage from FGD studies. The seed, fertilizer and pesticide dealers had come in close contact with 99 to 100 percent of vegetable and banana farmers. Trusted service providers are DAE (average of 74% farmers), Labours contracting groups (Average of 73% farmers), BADC (69%), transport owners (68%), NGOs and suppliers (67%) and Faria/Paikers (66%). Except for a small percentage of (15%) aromatic rice producers, none of the VC crop producers had any relationship with the supermarkets.

Farmers Level of Trust on VC actors

The trust level on an average ranged from 59 to 100% level among farmers attending the FGD meetings. One hundred percent farmers trusted fertilizer dealers, 98% seed and 97% pesticide dealers and shops. A high level of trust (average of 88% farmers) also existed with DAE (SAAO/UAO) and labour contracting groups (86%). All farming groups seem to have low level of trust (33-43% farmers) on the consumers.

Constraints, opportunities and commercial solutions in the selected value chain

Discussions during FGDs to identify problems in production and marketing along with the VC. Most farmers (94%) raised the problem of high transportation cost. Lack of market linkage and market relevant information about 84% thus they faced lower profit. Similarly, inappropriate packaging materials like plastic caret, insufficient space and equipment's restrict quality of post-harvest management to get good price in the market in selected VCs. Pest infestation was a problem for 87% of rice and tomato farmer and 83% by brinjal growers. Above 70% famers expressed their concern of pest attack in bitter gourd, sweet gourd and banana. Insufficient number crate for product transport was a problem mentioned by an average of 84% VC farmers. Insufficient space for sorting, grading of products and no direct linkage to market was faced by a high percentage (83 to 84%) of the VC farmers.

Inadequate technical knowledge on scientific farming, use of poor quality of inputs remain in poor soil quality that increase production cost, lower yield and unsafe food for the consumers are the most frequently mentioned problems. Quality inputs are inadequate along with inappropriate application methods, timing, appropriateness are not maintained as per good agricultural practices. Most vegetable farmers are lack knowledge on better cultivation techniques, appropriate good quality inputs, poor crop management practices, poor post-harvest management, and informal relationship within the VC actors~~,~~. Lack of appropriate post-harvest management practices results in significant losses for farmers. Additionally, poor infrastructure at the farmer's market (no washing, cleaning, sorting and packaging facilities), absence of collection center made the value chain/supply chain weak and un-trusted relationship among the farmers, traders and consumers. Inadequate post-harvest infrastructure facilities, huge wastages and low quality products, lower market price, lower volume of produces results less bargain power, minimum market information getting less price ultimately loss in commercial production.

Summary of Constraints and Opportunities in Bangladesh			
Stage of VC	**Constraints**	**Opportunities**	**Probable interventions**
Pre-production	Absence of business oriented crop planning (business plan) for commercial vegetable (tomato) production	Pre-planning and effective supply chain management	Training and capacity building of the CIG/CCMC members on business planning as per market demand and contractors requirements
Inputs supply	Poor quality Inputs and its application Unavailability (and also timely delivery at retail point) of good quality inputs	High Demand of good quality inputs Agro-input Companies	Strengthen linkage between input suppliers and farmers with extension services Facilitate to improve distribution channel of reputed agro input companies Facilitate and link~~age~~ to get good quality commercial varieties of seed, good quality fertilizer, pesticides (linkage between CCMC and input supplying companies)

Summary of Constraints and Opportunities in Bangladesh			
Stage of VC	**Constraints**	**Opportunities**	**Probable interventions**
Production	Lack of knowledge on modern crop cultivation practices	Agro-Inputs companies	Facilitate CCMC, CIG and VC actors on capacity building and training on good ~~modern~~ farming practices (GAP) through private sector enterprises
	Inadequate extension services	Modern Agricultural Practices Good quality of inputs, good farming practices	Facilitate and capacity building of selected VC producers, and VC actors on GAP Facilitate and linkage building with agro inputs retailers, and output traders (supermarkets) Strengthen linkages with DAE through CCMC and CIGs
	Pest infestation in high quality vegetable production	Agro-Inputs companies	Training on disease and pest management of CIG members and CCMCs (linkage between CCMC and input supplying companies)
Harvest and Post-Harvest	Poor knowledge and practices on harvesting and post-harvesting management results high wastage and lower income	Appropriate post-harvest management Processors, exporters and super shops involvement	Training and capacity building on post-harvest management of the CIG members/CCMCs through private sector enterprises (e.g. processors, exporters, super shops, large traders)
	Poor packaging and unavailability of packaging material (Plastic crates)	Proper packaging from farmers field to the end market	Facilitation and training of proper packaging and linkage with packaging materials providers
	Lack of processing industries in the study area to add value to the products	Value addition	Linkage with the processing industries for sales and marketing
	Inadequate cool chain management from farm field to the end market	Fresh vegetable fruits to the market at a premium price	Facilitate to raise awareness and capacity building on cool chain management Support CCMCs/CIG or enterprises with refrigerated / refer van for transportation and sales
Processing	Lack of modern machineries Product formula Poor transport facility	Low cost modern machineries Value addition Product diversification	Facilitate to form contract farming with processors, aggregators and processors Product diversification
Access to Market	Poor market infrastructure and inadequate space for local producers and post-harvest management activities		Market Infrastructures development with good governance through CCMC
	Lack of Market information	High market demand Export possibilities	Facilitate CCMC/CIGs to provide regular market information through ICT
	Absence of contract farming	Effective supply chain and trustworthy relationship	Facilitate to start formal contract farming with processors, large scale buyers and exporter
	No direct market linkage with market actors to get profitable price	Effective supply chain and trustworthy relationship	Facilitate linkage among the large scale traders, processors and supermarkets with CIG members and CCMCs
	Lack of fair price	Win-win business relationship	Facilitate to get appropriate market information through ICT and other buyers
Access to Finance	Lack of access to finance restricts targeted farmers to apply agro-inputs in	Processing companies Agro inputs companies Contract Farming	Facilitate to easy access to finance with MFI and Banks

Summary of Constraints and Opportunities in Bangladesh			
Stage of VC	**Constraints**	**Opportunities**	**Probable interventions**
	appropriate time and quantity.		
	Inadequate access to finance for traders and Post-harvest management	Financial transaction through financial institute	Facilitate and advocacy on access to loan for traders with financial institutes
	Absence of institutional financing in perishable product business for the VC actors	Intuitional financial business models and tools	Advocacy and linkage with the relevant financing institutes
Organization and management	Inadequate market monitoring system	Market information cell	Strengthen market monitoring system by DAM and Hortex together
	Weak CIG and CCMC coordination with market committees	Strengthen CCMC and CIGs	Facilitate to strengthen relationship trust, and connect with VC actors and market committees
	No formal contract among the VC actors	Effective supply chain through contract farming business model	Facilitate CCMC and CIG to form contract farming production system with Large scale VC actors with good relationship, contact, and trust
	Lack of relationship, trust, contract and contact among VC actors	Effective supply chain through contract farming business model	Facilitate to strengthen relationship trust, and connect with VC actors and market committees
Consumers	Lack of awareness on safe food gap in domestic market	Safe food demand	Introduce GAP Standards and branding
ICT	Limited availability of farmer friendly ICT tools and Channels Farmers' lack of knowledge about ICT tools and Channels	Tracking and use of ICT tools in production, marketing and sales	Facilitate to introduce ICT apps and tools
Infrastructure	Transportation cost is high	Proper packaging and transportation facilities through private sector enterprises	Facilitate to use cool van, and group transportation system by the CCMCs/CIGs
	No Cold Storage facilities	Cold storage business	Facilitate to establish multipurpose cold storages through private sector enterprises
	Insufficient space and equipment's for washing, sorting, grading etc.	Fresh and good quality product in the market	Facilitate to advocacy with the market committees to allocate more space in the market and widening CCMCs place together
Regulatory	Lack of product standard	Introduce compliances	Facilitate and Hortex can advocate for the selected product quality specifications
	No quality control and Quality assurance policy	Export of the selected products	Establish QA/QC cell in the DAE along with Hortex
	No quality certification agency	GAP certification by Hortex	GAP and other quality compliances certification system to be established

Conclusion

Commercially sustainable agriculture demands effective promotion and development of location specific value chains of high value crops. Findings show that existing markets have no or very weak value chain in all targeted products. Based on the findings of the study Hortex may design and implement most effectively to ensure increased productivity, processing and safety of fresh and processed products. This can help attain higher yields, increase farms profits, and create win-win business relationships for VC actors without undermining the resource conservation on which the

agricultural system depends. The approach will explore connections between farming, trading, policy issues, business-enabling environment, and other aspects of the social, economic, and ecological environment to identify critical current constraints for production and marketing of products.

The Government of Bangladesh has already developed a protocol to develop Good Agricultural Practices (GAP) of few crops, establishing that as a major priority of the new Agricultural Policy. The policy also calls for development and implementation of protocols for codes, standards and regulations to fulfill trade and food safety and quality requirements. It incorporates the four pillars of GAP: economic viability, environmental sustainability, social acceptability, and food safety and quality. Transfer of technologies and diversification and intensification of crop production through appropriate extension services are also crucial for all stakeholders of targeted crops.

Recommendations

Strengthening the value chain involve four areas of activities: (i) capacity development of farmers, traders, processors and retailers to provide safe food; (ii) the establishment of modern infrastructure CCMC (iii) the use of credit to facilitate the introduction of technology to improve efficiencies and (iv) Improve competitiveness VC actors.

Training will largely have to be centered on the introduction of good agricultural practices (GAP), post-harvest management, agri-inputs linkages, market linkage across the value chain. Training will also involve building the capacity of traders and wholesalers to improve quality through grading and the use of packaging to reduce losses. Business management training for farmers and traders also require d to improve their understanding of financial management and to evaluate which changes are likely to improve profit margins and efficiencies.

The introduction of ICT at this level would strengthen market linkages between major markets in Dhaka and traders operating out of collection centers.

- Strengthen capacity (pre-production, production, post-harvest marketing to final market) of the all value chain actors through CCMC engaging private sector enterprises
- Capacity building on post-harvest management through training of VC actors
- Introduce contract farming system with VC actors
- Linkage building with appropriate inputs and outs actors along with the value chain
- Ensure easy access to financial inclusion for value chain actors
- Introduce ICT for market information and e-trade
- Infrastructural improvement in CCMC level
- Introduce cool chain and appropriate transportation system for different products
- Commercial viability driven interventions should be taken into considerations through CCMC and CIGS along with private sectors enterprises to enhance desired impact on the economic empowerment of all value chain actors. This will emphasis on VC relationship, trust building and longtime business relations.
- Explore concrete options to set up capital loan bank guarantee services to agribusinesses enterprises (VC actors) at experienced commercial banks that actively support rural sector enterprise.
- VC specific market access has to be ensured by the project along with financial inclusion. Linkages building with trusted inputs supplier, retailers and market traders also considered.

Chapter I: Introduction

1. Introduction

1.1 Background

Development of value chain in Crop/Horticulture is a five-year initiative under National Agricultural Technology Program – Phase II Project (NATP-2), Package No. SD/Hortex-NATP2/12 funded by the World Bank, IFAD and GOB, and implemented by Hortex Foundation as strategic partner of Department of Agricultural Extension (DAE) to increase the agricultural productivity of smallholder farms and improve smallholders' access to markets in selected districts.

In this connection Hortex Foundation intend to conduct value chain analysis of 6 selected crops covering 30 cluster (upazila) areas as per specific terms of references and individual short term consultant agreement in order to ensure proper approach and methods to be adopted for the study. The analysis was look range of activities undertaken by farmers, traders, processors, exporters, service providers of selected commodities produced within the project sites. Consultant has conducted the field survey as per approved methodology, analyzed data and has been furnishing this draft report for appraisal of the Foundation for further improvement.

Value Chain – the set of actors (private, public, and including service providers) and the sequence of value-adding activities involved in bringing a product from production to the final consumer. In agriculture they can be thought of as a "farm to fork" set of inputs, processes and flows. Creating a successful value chain is an act of entrepreneurship. In a buyer-driven model, the challenge is to identify competitive production areas and tailor products to buyers' needs. Facilitator links producers and buyers in a chain. Whatever the entry point, a vital characteristic of a promising value chain approach is that a leading chain actor is prepared to invest time and resources in building relationships between suppliers (primary producers) and buyers. Sharing information, building capacity backward and forward actors, having trust are good indicators of mutual interest to strengthen VC especially in fresh produces in Bangladesh. Buyer-driven model it is often in the buyer's interest to procure a flow of products and use facilities, finance as a way of facilitating and/or committing producers, processors and others in the chain to sell to them under specified conditions. Market infrastructure, facilitation, service provision, market information should have governed by the private sectors ultimately buyers, usually it's a vertical integration from farmers to end buyers, binding through contracts and therefore contract farming is the most common buyer-driven value chain model, providing GAP, HACCP and compliance adaptation concern. Value chain strengthening is engine of agribusiness and rural development.

The report constitutes an introduction, a brief narration of the context of the project, methodology of the analysis and details analysis of 6 value Chains of targeted crops such as Brinjal-6 clusters, Bitter Gourd – 5 clusters, Tomato-6 clusters, Sweet Gourd-5 clusters, Banana – 5 clusters, Aromatic Rice-3 clusters with suggested interventions for each value chain. Based on the findings policies and strategies of developing the said value chains were enunciated at the end of the report.

1.2 Objectives

The primary objective of the value chain Analysis of selected 5 high value crops in 30 cluster upazilas are as follows:

- Draw a value chain map for 5 selected commodities presents all the relevant actors (e.g. farmer, relevant public and private sector actors - traders engaged in domestic and export markets, agro-processors) and their depth of relationship with one another.
- Based on the initial findings, identify main constrains throughout the value chains relating to post harvest technology, market access, agro-input supply, organization and management, finance, infrastructure, regulatory (policy) and quality control.
- To present and validate the findings of value chains analysis in a national workshop, and also facilitate the design of value chain development interventions along with actors who to be partnered in the upazilas wise value chain development program.

1.3 Scope of Work:

The consultant team conducts a Value chain study to understand the followings:

- Desk study on selected value chains – review of the relevant documents
- Target market visit for collection of relevant information through observation, KIIs, FGDs as and where applicable
- Prepare customized 5 value chain maps for five commodity of the project showing contact and relations among stakeholders
- Estimation of value progressions by different stakeholders of the 5 selected commodities within the VC map
- Identification of constraints and barriers encountered by stakeholders of the VC
- Recommendation of the interventions Value chain

1.4 Duration of Assignment

The study spread over four (4) months to complete the service. The duration of the assignment is from 27 February 2019 to 27 June, 2019.

1.5 Target Respondent:

The expected respondents are commodity specific and cluster specific, market actors such as inputs traders/ retailers, service providers, CIG members, output traders, market management committee, agro-processors, exporters and extension service providers such as UAO, SAAO, LBF, Marketing Officer, transporters, and others.

1.6 Study Area

As per ToR following 30 Value Chain Cluster upazilas were consider as study area:

Table 1: NATP-2 Value Chain Cluster upazilas for selected commodities (vertical expansion)

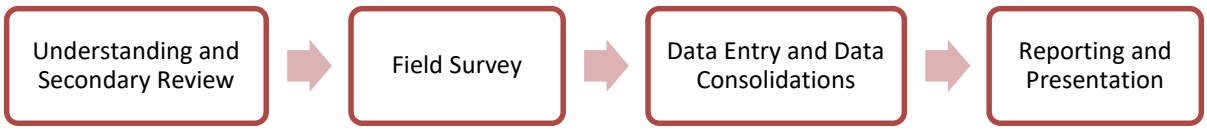
Brinjal-6 clusters	**Bitter Gourd – 5 clusters**	**Tomato-6 clusters**		**Sweet Gourd-5 clusters**	**Banana – 5 clusters**	**Aromatic Rice-3 clusters**
		Winter	Summer			
1.Raipura, Narshingdi	1.Kaligonj, Jhenaidha	1.Chandina, Cumilla	5.Bagherpara, Jashore	1.Sadar, Bogra	1.Shibgonj, Bogra	1.Birgonj, Dinajpur
2.Shibpur, Narshingdi	2.Modhupur, Tangail	2.South Surma, Sylhet	6.Jhikorgacha, Jashore	2.Boraigram, Natore	2.Polashbari, Gaibanda	2.Chirirbondar, Dinajpur
3.Sadar, Jashore	3.Belabo, Narshingdi	3.Mirrersorai, Chittagong		3.Delduar, Tangail	3.Kapasia, Gazipur	3.Nakla, Sherpur
4. Islampur, Jamalpur	4.Sadar, Naogaon	4.Godagari, Rajshahi		4.Sadar, Kishoreganj	4.Sadar, Khagrachari	
5.Sreemongal, Moulovibazar	5.Mithapukur, Rangpur			5.Savar, Dhaka	5. Muktagacha, Mymensingh	
6.Parbatipur, Dinajpur						

Chapter II: Methodology

2. Methodology of the Study

2.1 Introduction

Both the primary and secondary data (mix method) were used for value chain analysis from published and unpublished documents of BBS, DAE and Hortex Foundation. Primary data were collected from CIGs farmers, members of the market management committee (MMC), inputs traders/ retailers, output traders, agro-processors, exporters and extension service providers, transporters, and others. CCMC observation and spot visits and field surveys as applicable both for qualitative and quantitative information. Tools and questionnaires were developed as per ToR, evaluation guiding questions and finalized in consultation with the project team.



Value chain map main constraints prevailing throughout the value chains relating to technology, market access, agro-input supply, organization and management, finance, infrastructure, regulatory (policy) and quality control will be identified at each knot.

Specific interventions to assist actors in the value chains to address constraints with due consideration to value addition from farm to fork, market linkages and sustainability from interviews with stakeholders, expert opinions and past experiences of the consultants.

The **first step** of the assessment team was reviewed from the secondary documents to selected value chain related information. Secondary data was extracted from GoB, BBS, DAE, DAM and other sources. This secondary review has continued till finalization of the report writing. The **second step was collected** primary data including qualitative and quantitative information through PRA methods and using formatted questionnaire, checklists, and value chain maps. As part of this step, the assessment team was oriented with those tools and trained to use those tools. Through Focused Group Discussions (FGD)-30, Key Informant Interview (KII)-40, and value chain mapping-6 were used for primary data collection. The **third step** was data entry, data consolidation, and presentation to Hortex. Data was validated and, receive feedback during the design workshop and the **final step** was incorporated comments, suggestions and feedback from sharing workshop and finalizes the report.

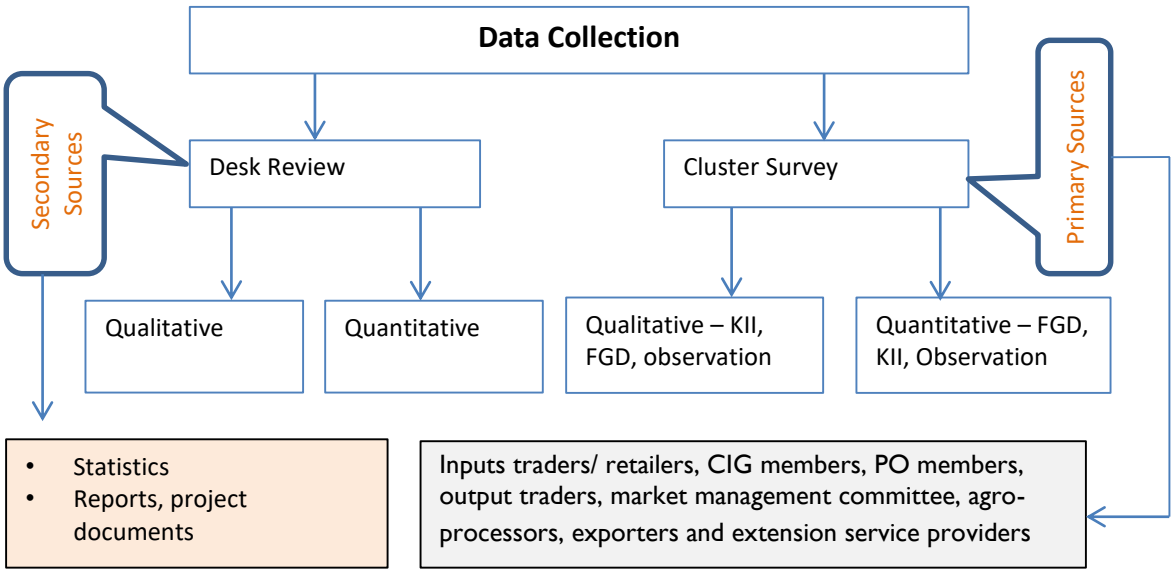


Figure 1: Data collection process

2.2 Activities:

- Document review : Desk Work, secondary information
- Tools development : KII (Inputs traders, commodity traders (Foria, Paikers, Aratders, Wholesalers, retailers, super markets, exporters, processors), LBF, SAAO, others)
  : FGDs (CIG, Traders)
- Field data collection : Consultation, interview, FGD, KII, Observations
- Data Analysis and Draft reporting
- Presentation and Feedback from Hortex
- Final Report

2.3 Respondent of the study

Purposive sample design was followed for respondent selection and finalized in consultation with Hortex Foundation. Focused Group Discussions (FGD) and Key Informant Interview (KII) had provide primary data and information. The respondents were commodity and cluster specific, market actors such as inputs traders/ retailers, providers, CIG members, output traders, agro-processors, exporters and extension service providers such as LBF, SAAO, UAO, Marketing Officer, market leaseholder, and others. A sample table is given below:

Table 2: Sampling of the respondents

Tools	Target groups and criteria	Details
FGD	CIG Members	30 (each upazila one, near to CCMC, PO)
	Value Chain Actors	20 large potential target markets
KII	Inputs Suppliers/ retailers	25 nearby the CIG and CCMC or PO
	Local Service providers (SAAO)	As available - commodity specific
	Market trader (Foria, Paikers, Wholesalers)	40 (Commodity specific)
	Local Retailers	14
	Super markets	4 at Dhaka level
	Processors	2 - commodity specific
	Transporter	5
	Exporters	3
	SAAO	30
	UAO	30
	LBF	30 Each of CCMC

Draft data collection tools is given in annexure I

2.4 Work Flow of the Study

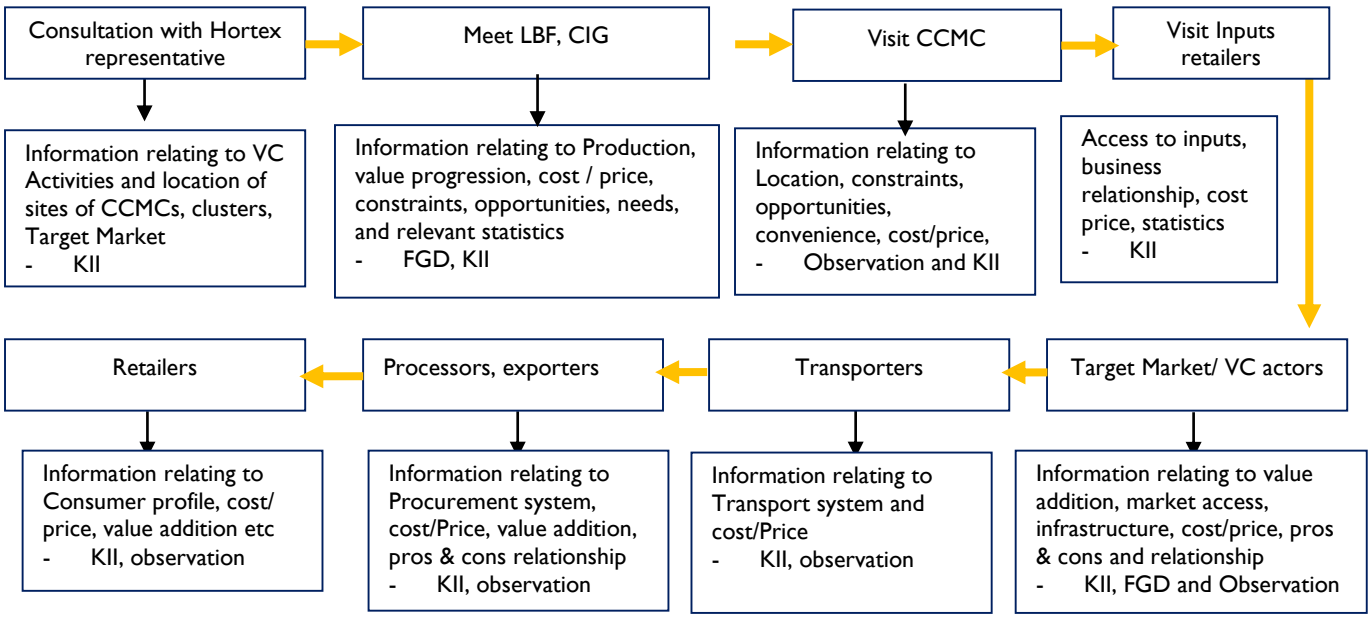


Figure 2: Work flow of the value chain study

2.5 Objectives wise approaches

Objective # 1:Drawing "value chain map'

The consultant used a dummy generic VCM as shown in the Figure below to customize the map for 6 products of the project by questioning the stakeholders while met individually as KIIs and in group (FGD).

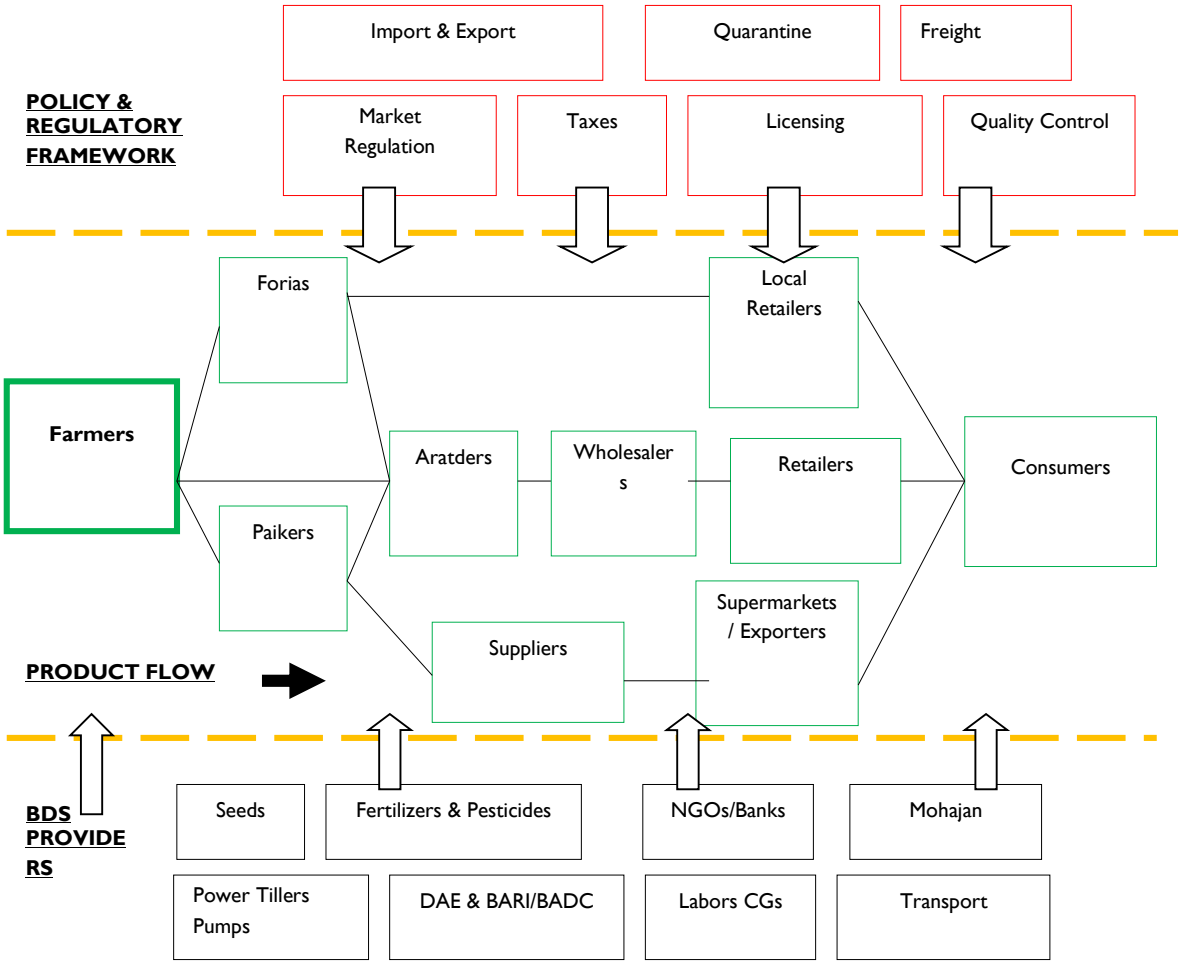


Figure 3: Generic Value Chain System of an Agro-product

Using the map two important parameters were measured such as Contact and Relationships among stakeholders. Both were measured in Likart Scale. Contact was measured as frequency of contact as once in a day, a week, a fortnight, a month or in a year and no contact (0-5 points scale). VC does not exist if there is no contact. Similarly, depth of relation was measured in terms of a 10-point scale (0-10) based on existence of 1) contact, 2) contract, 3) mutual support, 4) deferred transaction, 5) loaning practice, 6) helping attitude, 7) mutual entertainment, 8) advance transaction, 9) meet in social gathering, 10) taking side in conflict. These will be presented in Spider Maps

Objective # 2:Identify existing major production and marketing practices

Existing major production and marketing practices, value progression, production amount in ton of the designated clusters, market demand in terms of quantity and quality; main constrains throughout the value chains and specific interventions to assist actors in the value chains will also be identified by questioning stakeholders. Data thus collected and presented in a report.

Objective # 3: Identification of constrains throughout the value chains

Using the map main constraints prevailing throughout the value chains relating to technology, market access, agro-input supply, organization and management, finance, infrastructure, regulatory (Policy) and quality control were identified at each knot

Objective #4: Identification of Specific interventions
The consultant ~~was~~ identified specific interventions to assist actors in the value chains to address constraints with due consideration to value addition from farm to fork, market linkages and sustainability from interviews with stakeholders, expert opinions and past experiences of the consultants.

Objective #s Validation of Findings
The consultant presented the findings of value chains analysis in a national workshop for validation, and also facilitate the design of value chain development interventions along with actors who to be partnered in the upazila wise value chain development program.

2.6 Steps of the Value Chain Study

Understanding of the Assignment
Several meetings and interactive discussions were conducted with the Hortex team to understand the needs, terms of references, clusters, crop zones, methodology, tools and other relevant.

Secondary Documents Review:
Continuous desktop review of relevant documents of the project like relevant reports, studies, publications, statistics etc. had been conducting throughout the assignment.

Data Collection Tools Development:
In-consultation with Hortex data collection tools was developed. There were different categories of the instrument such as; questionnaire for farmers, actor specific questionnaire in selected value chain, questionnaire for consumers, questionnaire for DAE officials, and LBF. Before field data collection starts FGD questionnaire were tested and necessary adjustment were made, then the questionnaires were translated into bangla for easy facilitation in local language.

Team formation, Orientation and Training
After finalization of the tools, the team ~~had~~ oriented field staff with ~~on~~ the methodology, data collection, data quality management, and overall purpose of the assignment. Four teams ~~were~~ worked simultaneously in in 30 clusters.

Focus Group Discussion (FGD):
Four teams ~~were~~ worked simultaneously in the selected clusters. The Field coordinator earlier with LBF, share about participants' categories and objectives of the study. LBF arranged FGDs and KIIs. Each team had one facilitator and one note taker to conduct and facilitate FGDs with pre-determined questionnaire and tools. Each team conducted one 2 FGDs (one with Farmer, One with VC actors) daily. During FGDs, a numbers of tools, checklist, and questionnaire were used.

Key Informants Interview (KII):
Total 100 KIIs were conducted from key expert areas such as Officials of Department of Agricultural Extension (DAE), LBF, value chain actors, consumers, and exporters the target areas and other relevant key experts.

Debriefing:
At the end of the field visit, a debriefing meeting was held with Hortex representatives at Dhaka. On the basis of field visit, the team briefed to get feedback, format of the report, comments and suggestions, for necessary adjustments.

Third Step: Data Entry and Analysis
The **third step** was data coding, data entry, data cleaning, data analysis and draft reporting. Most of the collected data were qualitative to interpret those necessary coding and reformed into quantitative for data analysis.

Data analysis and Report writing:
All field data from all individual sources was entered into a preset template to prepare a database, then data was analyzed through SPSS, MS Excel for tabulation, graphs, relational database, frequencies, central tendencies, variances, comparison, etc.

Report prepared through analysis of secondary information, field data, observation, FGDs and KIIs all included qualitative and quantitative data. Triangulation of findings as per sources was checked and find relevancies, outputs and relevant to each of the selected value chains. The triangulation of data was conducted based on the similar findings and information as collected from different respondents. The information was compared with the findings of literature review for triangulation of similar information and validation of collected data.

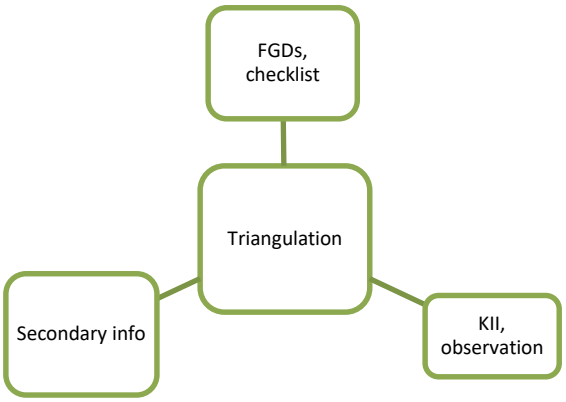


Figure 4: Triangulation of Data Analysis

Draft Report:
On the basis of field information, data analysis, triangulation with different source of information, and suggestion from Hortex draft report was prepared and submitted to Hortex for feedback, comments and suggestions.

Validation of Findings
Draft report was presented and the findings of value chains analysis in a national workshop for validation, and also facilitated the design of value chain development interventions along with actors who to be partnered in the upazila wise value chain development program.

Finalization of the Report:
Right after validation workshop, feedbacks incorporated on draft report of for finalization, and then final report submitted to Hortex.

2.7 Quality assurance

A written instruction on data collection was supplied to the field facilitators and consultants. Following steps was undertaken for the quality control and ethical practices for the study:

- Consultant himself visited all the locations, along with field facilitators, and other team members and conducted FGDs, KIIs as and where available
- A training and orientation session were provided to all field facilitators, team members to understand data collection methods, value chain study variables, quality parameters, and overall guideline for field data collection
- Survey team sat every evening to recheck and learning sharing the field information and make a conclusion
- During field work the supervisors was diligently check for completeness and consistency of the information returned on a daily basis

Chapter III: Findings of the Study

3. Findings of the Study

3.1 Bangladesh Horticulture at a Glance

Agriculture is the largest employment sector in Bangladesh. As of 2016, it employs 47% of the total labor force and comprises 16% of the country's GDP. Contribution of crops and horticulture sub-sector is 8.32% in national GDP in FY2015-2016. Bangladesh's agriculture is transforming from subsistence to commercial agriculture with higher level of inputs use and cultivation of different high value crops especially fruits and vegetables and market transformation. Safe fruits and vegetables can play a significant role in nutritional improvement, health improvement, employment generation, food and financial security of the people of Bangladesh through market diversification.

Bangladesh climate (both tropical and sub-tropical) and soils are suitable for cultivation of wide range of horticultural crops. High and medium high lands are mostly suitable for fruits and vegetables production. More than 100 vegetables, 70 fruits and 60 spices are produced represented by different species and varieties. Some major vegetables are egg plants, cucurbits, beans, tomato, okra, radish, cauliflower, cabbage, tomato, beans, aroids, carrot, leafy vegetables etc., fruits namely various kinds of citrus, jackfruit, mango, pineapple, papaya, guava, banana, water melon, litchi, hog plum etc. and spices namely onion, garlic, ginger, turmeric, green chili and coriander etc.

Growing seasons are winter, summer and or year round of some varieties and species. Vegetables are surfeit (an excessive amount) in winter and fruits in summer. Farming is blended of indigenous and improved varieties and technologies. Liberal seed policy facilitated introduction of exotic varieties/hybrids and strengthened research program of research institutes and agricultural universities, promoted more development of varieties/hybrids of horticultural crops. Horticultural crops have market value both in domestic and export markets.

In 2016-17 Bangladesh produces approximately 1.3 crore tones of vegetables (including potato), that is third largest in the world, next to China and India. As per BBS vegetable cultivation areas is about 1 million acres of land. Vegetables are cultivated on about 5% of the total arable land in the country. Growth trend of the winter vegetable is more than 13%, and summer vegetable is about 4%. Round the year vegetable is 15% in last three years. Per capita vegetable intake was around 50 grams per day in 2015 as against FAO recommended 300 grams a day. According to the World Health Organization (WHO), a healthy individual should take 220 grams of vegetable daily of which Bangladeshis intake only 70 percent of their need. The farmers are getting profit from vegetable production which is improving their livelihood. Youths are joining the industry and are achieving increased productivity with the use of improved technology and their talents, Women mostly in rural areas are directly or indirectly involved in agriculture. Poor standard inputs and application, testing facilities, an underdeveloped transportation system, poor market infrastructure, unscientific packaging, and various constraints at post-harvest management are severely affecting growth of the vegetables sector in Bangladesh.

	Production (MT) 2016-17	Area (Acre)
Winter vegetable	2363939	538146
Summer Vegetables	1,660,993	472949
Sub Total	4,024,932	1,011,095
Total	12,988,990	
Banana	807104	120203
Source: BBS-2018		

About five million people, including more than a million women, are engaged in commercial or homestead vegetable cultivation in Bangladesh. Farmers can earn considerably more from vegetable farming than cultivating traditional crops. The vegetable sector plays an important role in improving the livelihoods of small farmers. Due to its size and potential, the vegetable sector is also of great significance for the Government of Bangladesh. More than 12% of the rural population is employed in horticulture sector; more than a million of them are female laborers. In addition, a large number of women in rural areas are engaged in homestead vegetable cultivation (that is, growing vegetables in a small area of land around the house).

Over the last two decades, the productivity of Bangladesh's vegetable sector has increased by approximately 195%[1]. This growth has been driven by a vibrant private sector, government support, growing consumer demand for vegetables, cultivation suitability, and profit-earning potential. However, many small farmers especially from remote areas did not adequately benefit from this growth. Vegetable farmers are able to improve their yields and increase their incomes by improving the distribution channels of quality seeds, promoting balanced fertilization and eco-friendly crop protection methods, disseminating cultivation information, improving post-harvest management, and strengthening supply chain skills. Additionally, service provision also needs to be strengthened.

BFSA and NFSL are the legal and authorized organizations for safe food promotion in Bangladesh. BFSA is the government authority to set standards of safe foods, implements rules and regulations, promote safe food and create awareness among citizens. Hortex foundation is promoting fruits and vegetable value chain strengthening and export as well.

The Horticulture Export Development Foundation, in short, "Hortex Foundation" working for the development, promotion, and marketing of exportable agricultural/horticultural produces, particularly high value non-traditional crops to high price mainstream markets for improving farmers' income and national economy. The main focus of the Foundation is to organize, set up and develop supply and value chain management of high-value high quality agro-commodities for domestic and export markets.

DAE is the largest and oldest public sector agricultural extension organization and responsive to requests for assistance related to extension work. CCMC requires having frequent contacts with DAE at all levels. To utilize all available resources, supports and cooperation are needed among participating agencies and formal relationships can enhance smooth progress of project works.

3.2 Opportunities of Vegetable Sector

According to BBS approximately 15 million farms, 84 percent are on average between 0.05 to 2.49 acres (52 percent are between 0.05 to 0.99 acres)., Therefore vertical integration and improvement of the productivity is required for the fruits and vegetable sectors in Bangladesh. Additionally, processed food industry accounts for approximately 12.3 percent of the value of all manufacturing production ~~value~~ and employs six percent of the manufacturing labor force.~~;~~ Fruits and vegetables are the most common raw materials in these sectors.

Current emphasis by the MOA and all the NGO's working in the sector is on improving yield and production thereby increasing the income of the rural poor. There are 7.09 MMT in fruits 9.49 MMT in vegetables, 1.1 MMT spices demand gap in the market. Only in Dhaka city per month vegetable demand is 160328 MT, fruits 53104MT, potatoes 73077 MT and spices 12677 MT.

There are always hidden or dormant/latent demand exists in vegetables sectors especially for balanced nutrition as per WHO or FAO recommendation. However, in Bangladesh vegetable sector could meet less than 50% of its latent demand as mentioned in below Table. As per BBS 7.9 million MT fruits and 9 million tons' vegetable needs to produce to meet the country's domestic demand. Along with favorable climate and soil, availability of agricultural labor and a long agricultural background of the population are added advantages to grow this sector. According to BBS approximately 15 million farms, 84 percent are on average between 0.05 to 2.49 acres (52 percent are between 0.05 to 0.99 acres)., Therefore, improvement of the productivity is required for the fruits and vegetable sectors in Bangladesh. Additionally, processed food industry accounts for approximately 12.3 percent of all manufacturing production and employs six percent of the manufacturing labor force; fruits and vegetables are the most common raw materials in these sectors.

Current emphasis by the MOA and all the NGO's working in the sector is on improving yield and production thereby increasing the income of the rural poor. All this effort is totally lost when over 30% of product is lost in transit, post-harvest activities and inefficient market. The ~~end~~ consumers pay for the losses and

[1] Katalyst

complains about the high prices. No one wins in the value chain. If investment available in the following areas horticulture would flourish:

- Improving the infrastructure and condition of the markets
- Establishing well organized and professionally run rural level demand driven Commodity Collection and Market Center (CCMC), pack-houses in the production areas and modern facilities for the large scale distribution or Agribusiness Hubs
- Establishing cool chain all the way through from farm to consumers, encouraging the use of refrigerated vehicles
- Cool chamber in CCMC collection points in the production areas

Table 3: **Prospects of horticultural crops in Bangladesh**

	Production 2014-15	**Per capita demand**	**Demand at national level**	**Gap (Latent Market Demand)**
Summer Veg	1540235 MT			
Winter	2193920 MT			
Sub Total	3,734,155MT	64 g/capita/day for 160 million people*	12,848,000 MT (if demand 220 g/capita/day) for 160 million population*	9.1 million MT*
Potato	9,254,285	100gm	5.84 MMT about 6 MMT	
Total	12,988,440			
Source: BBS		* estimated		

Table 4:**Production and Demand gap in Horticulture Sector in Bangladesh**

Items	**Fruits**	**Vegetables**	**Potato**	**`Spices**
Area	0.14 million ha	0.38 million ha	0.46 million ha	0.35 million ha
Production	0.60 MMT	3.37 MMT	8.95 MMT	2.04 MMT
Present consumption (gm./head/day)	79gm	57.70gm	73gm	35gm -
Requirement for consumption (gm./head/day)	200gm	220gm	100gm	54gm -
Production requirement	11.68 MMT	12.85 MMT	5.84 MMT	3.15 MMT -
Production to be increased	7.09 MMT	9.49 MMT	Surplus: 3.11 MMT	1.11 MMT -

Source: BBS and Hortex Foundation

Currently, safe food demand increasing both in buyers and suppliers level in the retail and catering segments of the market, even imported fruits vegetables also available in market like UNIMART, Agora, Shwapno in Gulshan areas. The minimum entry requirements for the suppliers is to introduce good agricultural practices, improved procurement methods that manage the supply chain effectively and efficiently. Adopting and managing a GAP and HACCP system are part of these requirements and will become mandatory. Adopting HACCP, ISO standards and complying with GAP should become a positive marketing tool for the Sector to penetrate the world's markets too.

A recent study conducted by Hortex Foundation revealed that only in Dhaka city per month vegetable demand is 160328 MT, fruits 53104 MT, potatoes 73077 MT and spices 12677 MT, most of the vegetables are coming from rural areas especially from Jashore, Bogra and Cumilla region.

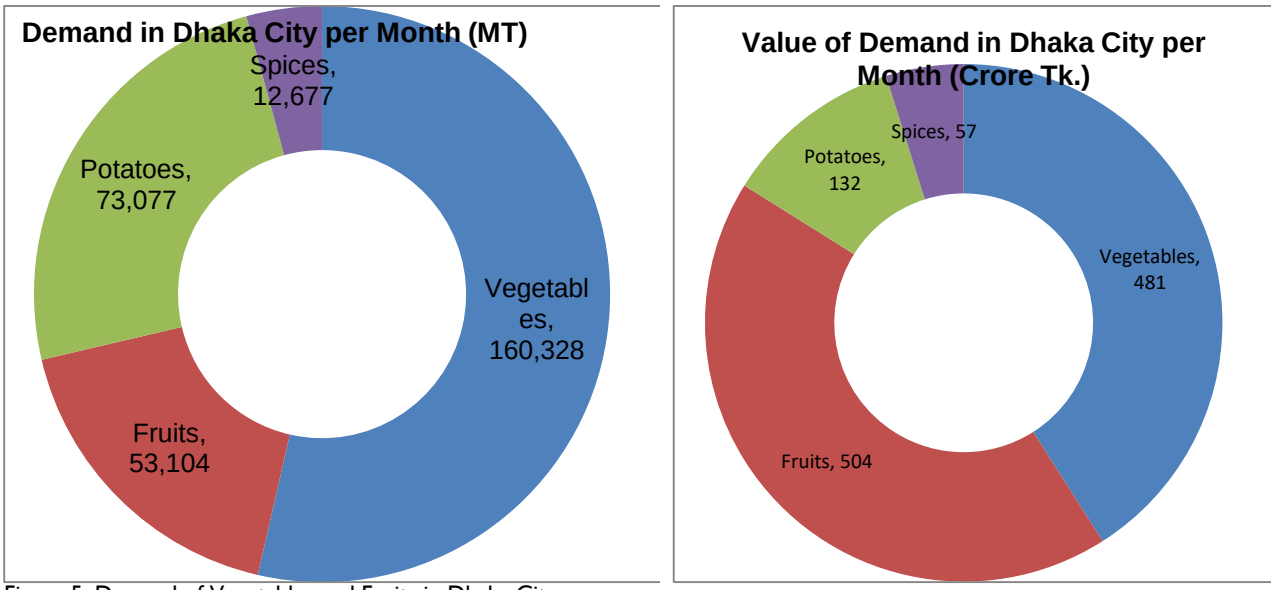


Figure 5: Demand of Vegetables and Fruits in Dhaka City

Export of Vegetables

About 100 types of fruits and vegetables are being exported from Bangladesh to 38 countries in the world. There is a substantial scope of horticultural crops export in the countries of EU, Middle East, Far East, South East Asia, USA, Canada and Russian Federation. Over the 8 years' period from FY2008-09 to FY2015-16, export earnings from this sub-sector had increased from US$ 50.71 million to US$ 124.57 million. The problem of horticultural crops export is enormous and of diversified nature. Firstly, it is still confined to ethnic markets and as such becomes susceptible to market volatility. Secondly, low level & unhygienic practices of production, improper pest & disease management, lack of market and business development approach, absence of pre-cooling, washing and pack house in the producing areas, poor harvest and post – harvest management practices including absence of cool chain management, transportation, marketing loss further accentuate the problem. Low level export operation is also being seriously hindered by high air-freight ~~cost~~ as compared to competitor countries, lack of palletization and washing, cool Chan, handling and scanning facilities at the airport.

3.3 Hortex Business Model

Hortex Foundation (HF) has developed a comprehensive business model linking the public and private sector organizations such as, Department of Agricultural Extension (DAE), Department of Livestock Services (DLS) and Department of Fisheries (DoF), entrepreneurs, traders, processors, exporters and farmers' organization - Common Interest Groups (CIGs) - and Producers' Organizations (POs) for extension and research support for production, financial services and linkages with the marketing organizations where strong linkage has been suggested between Commodity Collection and Marketing Centre (CCMC) and Producer Organization. In this model, line agencies such as, DAE, DLS and DoF will take leading role in facilitating production and making

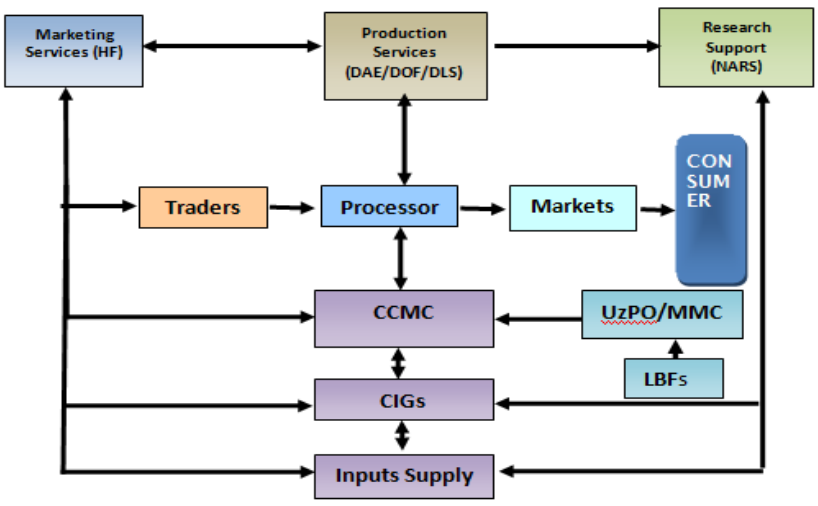


Figure 6: Hortex Business Model

availability of commodities to the Commodity Collection and Marketing Centre (CCMC), while Hortex Foundation will facilitate marketing of different agro-commodities in domestic and export markets.

Marketing Capacity Building in NATP-2 through Hortex

For capacity building of DAE and Hortex personnel, NATP-2 is providing ~~e~~ training of trainer (TOT) course for DAE officers, SAAO/AEO, Local Business Facilitator (LBF) and field trainers on production planning, marketing, contract farming, post-harvest management, value addition, food safety etc. The focus will be on strengthening of institutional arrangements and 'know-how' to support market-oriented production systems, including:

- Support to CIGs, POs and MMCs in commercial farming practices, including issues related to value chain development, business development, access to appropriate financial services and marketing support to improve access to markets, both through orderly contract farming and direct marketing, and other services (inputs, credit, technical support); and
- Improvements in institutional and operational effectiveness of Hortex, the specialized agency established by the Ministry of Agriculture (MOA), Government of the People's Republic of Bangladesh to promote post-harvest value addition and market linkages to accelerate growth of ~~high~~ supply chain of agricultural commodities and
- Development of effective linkages with the research system and support for validation trials, especially on local supply chain.
- Provide training to CIG/POs, DAE officials and entrepreneurs on business development and management, best practices of post-harvest management, organizing CCMC, transportation, and linkage with urban markets.
- Mobilize 15000 CIG farmers (300 new CIGs and 300 old CIGs) into value chain network along with traders, entrepreneurs and processors.
- Organize motivational and awareness building campaign/workshops for CIG and non-CIG farmers to form and operate CCMC for market linkages development.
- Provide training to POs/Market Management Committee (MMC) members on good governance, production planning, marketing, contract farming, financial management, book keeping, savings management etc. in selected old and new upazila.

3.4 Different value chain / market Actors

Marketing

There is a significant difference between the price what the consumers pay and the price what farmers get (as mentioned below Table 5). This means that farmers of the country are not getting the price at which products are sold in the market. The difference between market price at which consumer buy the agro-products and farmers' price at which farmers sell their products to the intermediaries caused by the improper infrastructure of marketing system, lack of market information, improper transportation system and market governance. Agricultural marketing should be changed for bringing sustainable development to the agricultural sector. Decrease in profitability of farmers due to getting low price for their products lead to unwillingness among farmers to invest in this sector. To reduce the impact of intermediaries from the market, steps should be taken by the growers with the help of respective authorities from the government. A group approach, collective collection and sales, appropriate market & extension services can be established at the local level of the country. The collective and cooperative will perform as marketers for the farmers ensuring fair price for farmers and consumers and that must be controlled and monitored by the farmers/traders of local area. Proper management, capital requirement, marketing orientation programs and other activities must be considered as major issues in this system.

Table 5: Market Actors and Price Progression along with VC

Market Actors	Brinjal	Pumpkin	Tomato	Bitter gourd	Banana	Aromatic Rice
Farmers	15	9	7	13	20	40
Faria	18	11	9	15	22	42
Aratdar	20	12	10	16	24	45
Dhaka Paiker	26	17	15	18	26	47
Dhaka Aratdar	28	18	18	22	28	47
WS/Dhaka Paiker	30	21	20	24	29	55
Retailer	35	25	24	28	35	70

Inputs Supplier / Retailer:

Inputs Supplier / Retailer are providing inputs to the producers / farmers. Traditionally local inputs retailers are the agent of inputs supplying large companies and sale on behalf of them as an independent business owner. Input retailers are the main key service providers for producer/ farmers and have direct linkage with them.

Farmer:

Farmers are the producers of the vegetables Producers are the main key value chain actors in the market system. They produce different types of vegetables and bring their products to sell in their local market nearby their village areas or some time sold direct from the field. The amount and types of vegetables differ from season to season. The producers usually farmer who farming e.g. land preparation, intercultural operations, seed sowing, transplantation, seed bed preparation, fertilizer & pesticide application, irrigation, timely harvesting and who after harvesting the produce performed the role of a seller in the market. The farmer sells 90% of their product to the local wholesaler/Faria and the remaining 10% for their own consumption or local retail market to retailers. Farmers are lack of modern knowledge on good agricultural practices, dealing with poor quality inputs and application knowledge, limited access to market. Farmers are lack of post-harvest management infrastructures causing wastages and poor quality of the produces and sold at a lower price to the market.

Aggregators / Paikers/ Bepari:

They are the market actors; collect produces direct from farmers locally as an individual owner. Sometime they work as agent of the large wholesalers, or processing companies. They have no fixed business premises. Bepari had no permanent shop. Usually they provide market information to the producers.

Local Aratders purchases their products from the farmers/baparis Basically, they fixed the price paid to the farmer at spot bargaining. Sometime very occasional Faria visited farmers' field and purchase direct for the field. They deal with the paiker or outside wholesaler. Local wholesaler sends their product lot to the different division mainly Dhaka, according to the market demand and market price. They also sell their product to the local market, but a little amount. They make a market margin of 15% to 25%. Usually local faria and traders' lack of knowledge about post-harvest management, no cool chain facilities, no grading sorting, and packaging facilities always rely on irregular labor and transportation system in the market; some of them have no knowledge about additives for increasing shelf life and transportation. Due to small volume handling less power in the market to bargain for price and quality. Local traders are lack of post-harvest management infrastructures causing wastages and poor quality of the produces and sold at a lower price to wholesaler in the market.

Faria:
A small trader who deals in products within three or four local markets and handles a small volume of products. A faria purchases products from farmers and sells them to either a bepari or direct to consumers. They are usually landless laborers or small farmers with no full-time work.

Bepari: A professional trader who purchases agricultural products from farmers or farias in the local market or village. This group handles a larger volume of products then Farias. Beparis sell their products to Aratdars.

Aratdar:
Aratdar is a commission agent in a large market. The Aratdar are licensed traders. The Aratdar are relatively big traders and then handled relatively larger volume of products than that done by the other traders like Bepari, Paikers, and aggregators. They had fixed business premises. Most of the Aratdar are independently organized and self-financed. They employed both labors and other staff on daily wage and salary basis for performing various functions. The assessment team could not find any women aratdar in the market.

An Aratdar serves as a fixed commission agent with a fixed establishment. They operate between the Bepari and retailers, charging a fixed commission for providing storage facilities

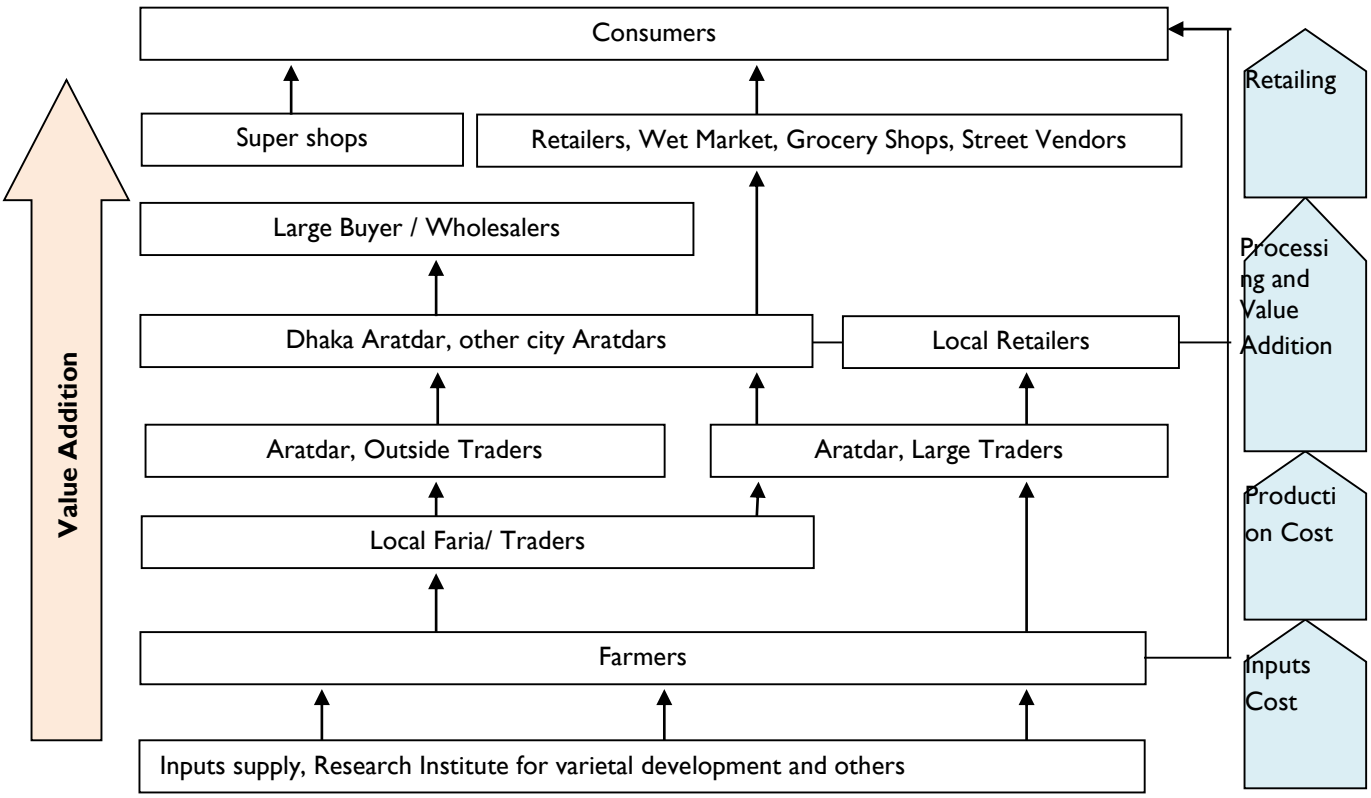


Figure 7: Traditional Value Chain of Vegetable and Fruits in Bangladesh

Local wholesaler/Faria:
Local wholesaler purchases their product from the farmer. Basically, they fixed the price paid to the farmer at spot bargaining. Sometime very occasional Faria visited farmers field and purchase direct for the field. They deal with the paiker or outside wholesaler. Local wholesaler sends their product lot to the different division mainly Dhaka, according to the market demand and market price. They also sell their product to the local market, but a little amount. They make a market margin of 15% to 25%. Usually local faria and traders lack of knowledge about post-harvest management, no cool chain facilities, no grading sorting, and packaging facilities always rely on irregular labor in the market, some of them have no knowledge about additives for increasing shelf life and transportation. Due to small volume handling less power in the market to bargain for price and quality. Local traders are lack of post-harvest management infrastructures causing wastages and poor quality of the produces and sold at a lower price to wholesaler in the market.

Wholesaler
The wholesalers are both licensed and non-licensed traders. They were relatively medium traders like Bepari and they handled relatively larger volume of produces than that done by other traders. They are independently organized. Many Wholesaler have own fixed premises are not. Wholesaler usually sale produces to the retailer.

- **Divisional wholesaler:** Divisional wholesaler collects their product from local wholesalers. They deal with a large amount of vegetable. Actually, they act like a divisional distributor mainly from Dhaka. They sell their product to the regional wholesaler. They serve as a fixed commission agent. They also sell their product to the local retailer. They make a margin about 5% to 10%. Similar like other traders wholesalers do not have sales platform, everyday changing markets and locations, lack of knowledge on post-harvest management, no cool chain facilities, no grading sorting, and packaging facilities always rely on irregular labor in the market, no transport facilities, sharing transport with few others wholesalers, limited volume to bargain with next level actors in Dhaka city. Wholesalers are lack of post-harvest management infrastructures, poor transportation causing wastages and poor quality of the produces and sold at a lower Aratdars at large city level market.

- **Regional wholesaler / Dhaka Level:** Regional wholesaler collect product from the divisional wholesaler. Sometimes they collect their product from local wholesalers. They make a market margin about 5% to 10%. Wholesalers do not have sales platform even own space, immediately sold to the retailer, everyday changing markets and locations, no long time or formal relationship with the buyers, lack of knowledge on post-harvest management, no cool chain facilities, no grading sorting, storing and packaging facilities always rely on irregular labor in the market made always in risk. Wholesalers are lack of post-harvest management infrastructures causes high wastage.

- **Retailer:** Retailer is an end connector to market. They are directly linked to the consumer. They purchase their product from the wholesaler and sell to the consumer and make a market margin about 15% to 20%. Most of retailer have own space to sale product in the selective markets (in Dhaka North City Corporation have 300plus retail market). Retailers continuously putting water, with others making the product visibly good which dangerous for safe, though they lack of knowledge on post-harvest management, no cool chain facilities, no packaging facilities, no storage facilities. Retailers are lack of post-harvest management infrastructures causing wastages and poor quality of the produces.

- **Super Market/Shops:** During these days' super shops are getting popularization and in increasing trend, e.g. Agora, Shwapno, Mina Bazar, UniMart, Prince Bazar etc, those have multiple outlets in different locations, at their own brand. Agora Shwapno have own procurement channel vegetables collection points down to the farmers. Apart from this they have selected suppliers to sold fresh produces to the outlets. The super marketers have 32 member's association even Shwapno have 135 outlets, Agora 12, however they are selling 4-5% products to the market especially Dhaka.

Market Channels
Marketing channels and market actors vary widely with the types of produce and production locations.

There are five intermediaries in the major distribution channel:

Faria: A small trader who deals in products within three or four local markets and handles a small volume of products. A faria purchases products from farmers and sells them to either a bepari or direct to consumers. They are usually landless laborers or small farmers with no full-time work.

Bepari: A professional trader who purchases agricultural products from farmers or farias in the local market or village. This group handles a larger volume of products then Farias. Beparis sell their products to Aratdars.

Aratdar: An Aratdar serves as a fixed commission agent with a fixed establishment. They operate between the Bepari and retailers, charging a fixed commission for providing storage facilities.

Retailer: Retailers are the last link of marketing channel. They purchase products from Beparis through the Aratdars and sell them direct to consumers.

3.5 Brief on Selected Value Chains and Clusters:

3.5.1 Summer Vegetables

More than fifteen vegetables grown during the summer in Bangladesh, the technical team found 7-8 have more potential namely brinjal, tomato, cucumber, bitter gourd, bottle gourd, pumpkin, okra, pointed gourd, are most suitable for the safe food and high value crops value chain, which are the highest contributors to horticultural production. Bangladeshis living at home and abroad are increasing the portion of vegetables in their diets, which is increasing demand at an estimated 4.75 percent each year in the domestic market and 29 percent in exports. With the growing middle class and urbanization trends, domestic demand is projected to increase as much as 11 percent annually in the coming years. Safe food concern has good market demand as found during the market and consumer observation. Since last 3 years' summer vegetable production growth as calculated about 4% each year both production and area coverage. Among them pumpkin highest growth over 13%, (in 2014-15 it was 100493MT), followed by cucumber 9%, okra 9%, ash gourd 5%, and brinjal 4%.

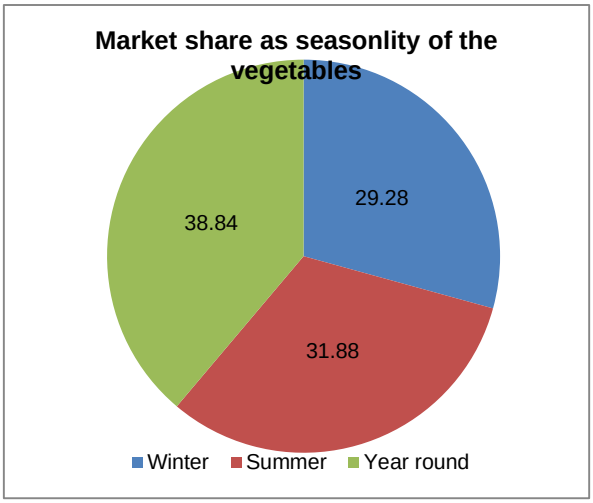


Figure 8: Market Share and Seasonality of Vegetables in Bangladesh

Table 6: Selected Fruits and Vegetable Production in Bangladesh						
Name of Summer Vegetables	2014-15		2015-16		2016-17	
	Area (acres)	Production (MT)	Area (acres)	Production (MT)	Area (acres)	Production (MT)
Pumpkin (Kharif)	27377	100493	28070	104723	27833	103900
Brinjal(Kharif)	45644	139792	46068	164667	45665	159891
Bitter Gourd (Karala)	24133	52332	24750	54539	26250	57386
Total Summer Vegetables	462032	1540235	463369	1605918	472949	1660993
Source: BBS						

3.5.2 Winter Vegetables

Winter is the main vegetable season in Bangladesh more than 20 vegetables are growing in this season among them 8-9 high value vegetables can be selected for the project such as tomato, potato, cauliflower, cabbage, country bean, carrot, brinjal, Bottle gourd, turnip is the most potential for the MVCIDP. Since last 3 years' winter vegetable production growth as calculated about 14% each year both production and area coverage. Among them tomato highest growth over 29%, (in 2014-15 it was 413610MT), followed by cauliflower 28%, brinjal 16% and pumpkin 13%.

Table 7: Selected Winter Vegetable Production in Bangladesh						
Name of Winter vegetables	2014-15		2015-16		2016-17	
	Area (acres)	Production (MT)	Area (acres)	Production (MT)	Area (acres)	Production (MT)
Rabi Brinjal	76370	310354	78458	**340150**	80195	347541
Rabi pumpkin	42622	177899	42636	186112	42612	190646
Tomato	75602	413610	67535	368121	68366	388725
Total-	529023	2193920	527908	2268978	538146	2363939
Source: BBS						

3.5.3 Year Round Vegetables

Now-a-days vegetables are grown round the year, due to demand of the vegetables are growing more than 10% rate. However, 6-7 vegetable as popular as year round in Bangladesh all of them have positive growth and market share about 38% total vegetable sector except potato, and growing faster than others is about 16%. Tomato, pumpkin, brinjal and cucumber are popular year round vegetable in Bangladesh.

Table 8: Statistics on Vegetable production and Growth in Bangladesh

Year Round Vegetables	**Production in 2014-15 (MT)**	**Market share**	**Growth (%) last 3 year average**
Pumpkin	278,932	7.47%	13%
Brinjal	450,156	12.05%	11%
Tomato	413,610	11.07%	29%
Bitter gourd	52,332	1.40%	1%
Sub Total Year Round	1,450,530	38.84%	16%
Sub Total Winter	1,093,685	29.28%	14%
Sub Total Summer	1,190,490	31.88%	4%

Table 9: Price and Value Addition at Different level of VCs

	Brinjal	Pumpkin	Tomato	Bitter gourd	Banana	Aromatic Rice
Farmers	18	11	17	17	20	40
Faria	20	13	19	19	22	42
Aratder	21	14	21	22	23	45
Dhaka Paiker	23	17	23	24	24	46
Dhaka Aratder	24	18	26	26	26	47
WS/Dhaka Paiker /processor	27	21	28	28	28	55
Retailer	33	25	34	35	32	70

During the value chain survey, it was found that the farmers are getting only small amount of the total price but at end customers pays double, sometime triple than farm price, it was due to handling cost and post-harvest losses in different steps of the handling. Poor / absence of post-harvest infrastructural facilities in the market places, low knowledge on PHM, poor transportation huge wastages increases cost, and all paid by the customer, even substandard quality of produces. To ensure good quality vegetable, market actor needs extra care on packaging, transportation, handling etc. which create the additional payment

3.6 Value Chain in Traditional Agricultural Market

In general commodities are produced, procured and distributed through various marketing channels to the ultimate consumers all over the country. Product flow or market channels are not demarcated to avoid misunderstanding about value chain. In a traditional system all stakeholders exist and act independently to produce and send to consumers by whatever means available as in **figure 9**.

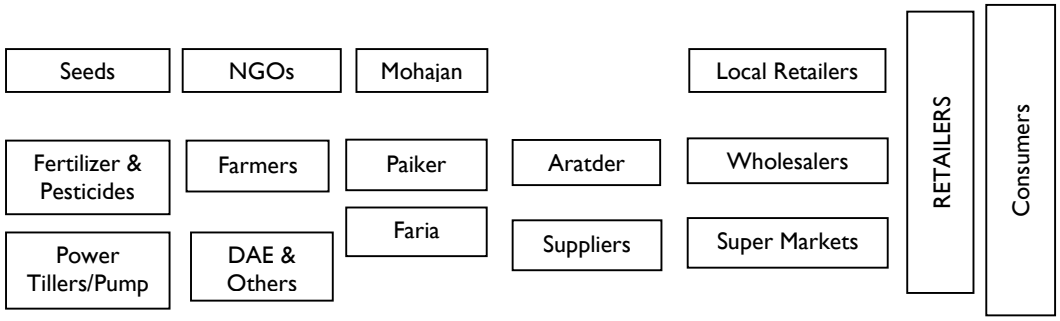


Figure 9: Actors in the Value Chains

The most common feature of the traditional system is that the market actors independently operate in isolation from each other's. In order to keep others in dark they hide the essential market information viz. demand, supply and prices. These help them maximize their own benefits at the cost of others. They do not trust each other and do not maintain formal contacts or contracts. Often they commit breach of trust (broke business deals) as there is no law or there is no system of enforcing contracts. Eventually each try to maximize own gain at the cost of others. In this phenomenon both producers and consumers lose most in terms of prices of the products. In this process no product can be developed as the product can be adulterated, quality deteriorated or cost of processing and handling increased to a level that people do not find incentive to improve or reduce the costs. As a result, the product loses competitiveness in the market place

Interventions of the FMSP helped emerged a new marketing map of selected commodities (sub-sectors) in specific locations in which all stakeholders are identified related to the product flow from the producers to consumers. Service providers are also identified, linked and trained to perform better to increase productivity, improve quality and act as corporate body as in Figure 9.

The distinguishing features of the emergent system are that some of the actors are linked for mutual benefits. There is information flow. They have mutual trust and confidence through dialogues and discussions. They have frequent formal contacts, often some of them have contracts (written or oral) and a win-win situation is created. They act as corporate body to remain competitive as competitive to their competitors.

3.7 Findings from field survey:

3.7.1 Farmer's Interview during FGDs

- **Age and Education of the Farmers**

The average age and schooling of famers was recorded during the FGD interview. Farmers cultivating Brinjal had an average age of 35 years. that of tomato 33 years, of Bitter Gourd 40 years, Sweet Gourd 38 years, Banana 36 years and of aromatic rice 46 yrs. The average age of the farmers cultivating vegetables was 38 years with standard deviation of 4.60 meaning very little variations. The data shows that the youth and middle aged farmers were cultivating vegetables but rice has been cultivated by elderly and the youngest were growing tomatoes. The rice growers had the least years of schooling (7), the brinjal and banana growers had the highest of 10 years of schooling. Farmers of other crops had average schooling years of 9 years (Table 10).

Table 10: **Average Age and Schooling of Producers**

Value Chains	Average Age (Years)	Average Years of Schooling
Brinjal	35	10
Tomato	33	8
Bitter Gourd	40	9
Sweet Gourd	38	8
Banana	36	10
Aromatic Rice	46	7
Total	**38**	**9**

- **Average Size of total Land Cultivated by Producers**

The land ownership and used for cultivation of targeted was ~~also~~ discussed in the FGD. The average land size of owned, leased in and leased out was 6.36 acres, a wide variation existed on the land used for each targeted crop. On average the land ~~size~~ used was the least for tomato (0.5 acres) and sweet gourd (0.6 acres). Banana, Brinjal, and Bitter gourd cultivated about one acres on average. Aromatic rice, a high value crop, was cultivated on an average area of 2.0 acres out of a farm of 13.2 acre.

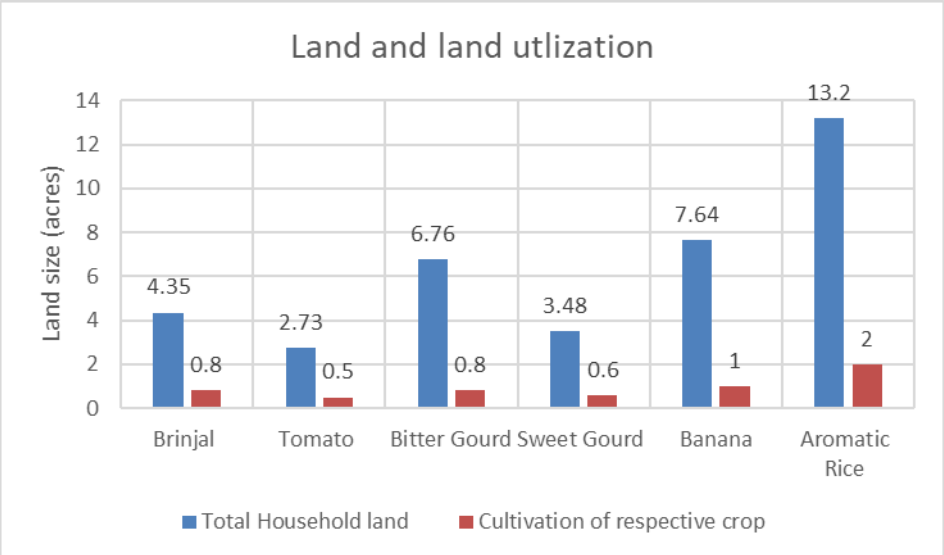


Figure 10: Household land for cultivation and its utilization as per selected Value Chain

- **Cost of Production, revenue earned and cost benefit ratio**

The cost-benefit analysis of value chain crops is an important issue. The cost per acre was stated to be the lowest in case of aromatic rice (Taka 31,367) and the revenue earned was Taka 47,300. The farmers had a cost-benefit ratio of 151% significantly lower than brinjal (214%), tomato (222%), bitter gourd (223%) and sweet gourd (176%). The cost-benefit ratio was the highest (223%) in case of bitter gourd, with a corresponding high cost of production (Taka 83792/acre). The average benefit for ~~the~~ all the value chain

crops was about to double than the cost of production. It is also noted that none of respondent calculate their own labor cost, or land leased value to the production cost.

Table 11: Cost of Production, revenue earned and cost benefit ratio			
Value Chains	**Cost of Production/ Acre (Tk.)**	**Revenue earned/ Acre (Tk.)**	**Cost Benefit Ratio (%)**
Brinjal	77,167	165,109	214%
Tomato	87,812	195,308	222%
Bitter Gourd	83,792	187,067	223%
Sweet Gourd	55,364	97,492	176%
Banana	72,300	152,500	211%
Aromatic Rice	31,367	47,300	151%

- **Utilization and sales proportion of the farm produces on selected cluster**

The Farias bought 58% of the brinjal from farmers directly. Tomato, bitter gourd, sweet gourd and banana ranged from 40 to 46%. Only 25% of aromatic rice was bought by Farias, although this is the highest buyer of all the market players. Of all the produce, 40% of the bitter gourd was traded by Aratder. The Aratder also bought 39% of brinjal, 34% of tomato, 35% of sweet gourd and banana and 20% of rice directly. The Retailers bought 3 products directly, namely sweet gourd, banana and aromatic rice, an average of only 7%. The Suppliers preferred 4 products, namely tomato, bitter gourd, banana and aromatic with an average percentage of 10% each from the farmers. The farmers could market only 10% of tomato and 20% of aromatic rice directly to processors.

The home consumption of the products shows the least amount of sweet gourd (2%), followed by brinjal and banana (3%). Bitter gourd ranged 3 (4%) in home consumption. Among the vegetables tomato highest home consumption was tomato (6%). However, the highest home consumption of 10% was aromatic rice. Among the other buyers such as Faria, Aratder, Retailer, Retailer, Supplier and Processor the Farias bought the highest percentage (42%) of the averaged products. The Aratders accounted for 34% of the sale of products. The retailers (7%), Supplier (8%) and Processor (5%) bought a low percentage of all the products.

Table 12: **Utilization and sales proportion of the farm produces on selected cluster**							
Product	Home consumption %	Faria %	Aratder/ Paiker %	Retailer %	Supplier (%)	Processor %	Total (%)
Brinjal	3	58	39				100
Tomato	6	40	34		10	10	100
Bitter Gourd	4	46	40		10		100
Sweet Gourd	2	43	35	20			100
Banana	3	42	35	10	10		100
Aromatic Rice	10	25	20	10	15	20	100

- **Farmers Average Price to different VC actors**

The value chain shows differential pricing depending on the market consumers. Price offer by the faria always less than other VC actors as they collect vegetables direct from the farmer's field or from their home. After faria do the grading sorting and transport to the local market or to the regional even to Dhaka market. Except sweet gourd/ pumpkin faria price more or less Tk.20 per kg at the farmer's level. During FGDs it was stated by the participants and the price ranges from below Tk10 to Tk. 32 per kg depending of harvesting season and supply in the market. It also found that aratder offered little higher price but farmers have to bring produces to their trading premises in the main market. Pumpkin little bulky 3-5 kg per piece so that on pumpkin may be sold by Tk.20-30. The highest return was obtained for tomato (Taka 21/Kg) when sold to processor.

Table 13: **Farmers Average Price to different VC actors**					
Produces	**Faria**	**Aratdar**	**Retailer**	**Supplier**	**Processor**
Brinjal	18-22	20-24	25-35		
Tomato	15-22	20-25	31-36		20-25
Bitter Gourd	17-20	19-25	30-35	22-23	
Sweet Gourd	9-11	13-18	20-25		
Banana	19-22	20-24	27-32		
Aromatic Rice	40-42	42-45	60-70	50-55	55-65

Table 14: Price and Value Addition at Different level of VCs						
	Brinjal	Pumpkin	Tomato	Bitter gourd	Banana	Aromatic Rice
Farmers	18	11	17	17	20	40
Faria	20	13	19	19	22	42
Aratder	21	14	21	22	23	45
Dhaka Paiker	23	17	23	24	24	46
Dhaka Aratder	24	18	26	26	26	47
WS/Dhaka Paiker /processor	27	21	28	28	28	55
Retailer	33	25	34	35	32	70

- **Place of Sales/Trade:**

The FGD study also revealed interesting information on volume of sale at farm field, home and market. The proportionate sale of bitter gourd is 38% in farm, 11% at home and 51% at the market. Sweet gourd and banana mostly sold from their farm above then 50%, around 30-38 % of brinjal, tomato and bitter gourd, none old aromatic rice from the field. Around 11-20% sold from home. Farmers 51% sold in the local market of selected vegetables (brinjal, tomato, bitter gourd), banana 41%, and aromatic rice 77% used to sold in the market.

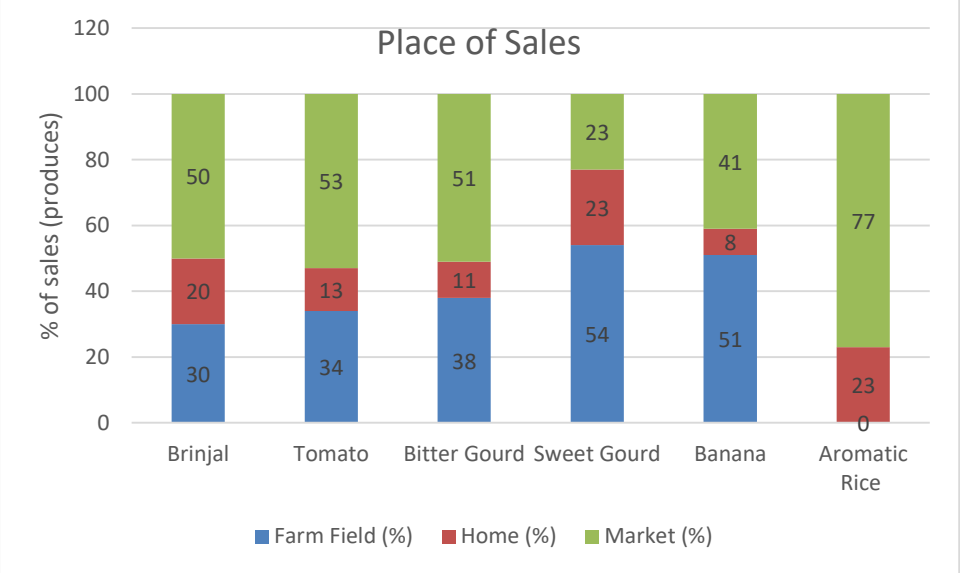


Figure 11: Place of Commodity Sales

- **Cost sales after harvest:**

Table below shows the cost of marketing that refers to labour, rent, market commission, market tax, loading, unloading cost (wherever applicable) as stated by farmers in FGD. When sale was done in the farm, the cost ranged from Taka 0.86 to Taka 1.0/Kg. This ranged from a proportionate of 12 To 19% marketing cost. Sales from home had an added value of Taka 0.96 to Taka 2.2/Kg. The proportion of cost ranged from 19 to 25% depending on the product. The highest addition of cost was when products are sold to the marketers. The added cost was lowest for bitter gourd (Taka 2.92/Kg). In summary, on an average the cost of marketing at farm level was Taka 1, from home was Taka 1 and at the market was Taka 3.

Table 15: Average Cost of Sales of VC Products (Tk./Kg)						
Whom	Farm		Home		Market	
	(Tk./Kg.)	Proportion %	(Tk./Kg.)	Proportion %	(Tk./Kg.)	Proportion %
Brinjal	0.98	18.99	1.2	23.26	2.98	57.75
Tomato	1	19.23	1	19.23	3.2	61.54

Table 15: Average Cost of Sales of VC Products (Tk./Kg)						
Whom	Farm		Home		Market	
	(Tk./Kg.)	Proportion %	(Tk./Kg.)	Proportion %	(Tk./Kg.)	Proportion %
Bitter Gourd	0.86	18.14	0.96	20.25	2.92	61.61
Sweet Gourd	1	18.52	1.3	24.07	3.1	57.41
Banana	1	18.87	1	18.87	3.3	62.26
Aromatic Rice	1	11.77	2.2	25.88	5.3	62.35

** Cost includes labour, freight. rent, levy, market tax, loading unloading, etc.

Most products needed post-harvest value addition before going to the market. This enhances the keeping quality and attractive and therefore the sale price. The activities discussed in the FGD were on costs of pre-cooling, washing, sorting, grading, treatment, drying, packaging and transporting. None of the products needed pre-cooling, any treatment or drying. The average cost required treatment for brinjal was Taka 2.98/Kg, tomato Taka 3.2/Kg, bitter gourd Taka 2.92/Kg, sweet gourd Taka 3.1/Kg, banana Taka 3.3/kg and aromatic rice Taka 5.3/Kg. Of all the cost of transportation was highest (ranges from Taka1.38/Kg to Taka 2.21/kg), followed by packaging (ranges from Taka 0.78 to Taka 1.02/Kg).

Table 16: **Average cost of Sales for value addition activities per (Kg.)**							
#	**Activities**	**Brinjal**	**Tomato**	**Bitter Gourd**	**Sweet Gourd**	**Banana**	**Aromatic Rice**
1	Pre-cooling	0	0	0	0	0	0
2	Washing (when needed)	0.25	0.27	0	0	0	0
3	Sorting	0.29	0.31	0.32	0.29	0.3	1.36
4	Grading	0.28	0.33	0.35	0.31	0.34	0
5	Treatment	0	0	0	0	0	0
6	Drying	0	0	0	0	0	0
7	Packaging	0.78	0.85	0.83	0.92	1.02	1.73
8	Transporting	1.38	1.44	1.42	1.58	1.64	2.21
Total		**2.98**	**3.2**	**2.92**	**3.1**	**3.3**	**5.3**

- **Producers' contact with VC Actors**

The FGD meetings revealed the frequency of visits of producers with the value chain actors. At least 20 different actors exist in the value chain of farm products (Table 17). The frequency of visit shows the dependence of farmers to the various agents. The relationship of each of these cluster farmer's groups (30 in number) is shown in graphs. The results are stated in summary. Farmers have the highest and 100% contact with fertilizer dealers and shop. Ninety-eight and 97% had contact with seed dealers/shops and pesticide dealers, respectively. A range of 81 to 97% farmers growing any of the 6 crops have contact with other (farmer to farmer). More than 80% of the farmers had contact with Aratder (81%), labour contracting groups (86%) DAE (SAAO/UAO) (88%), Farmers having a lesser than

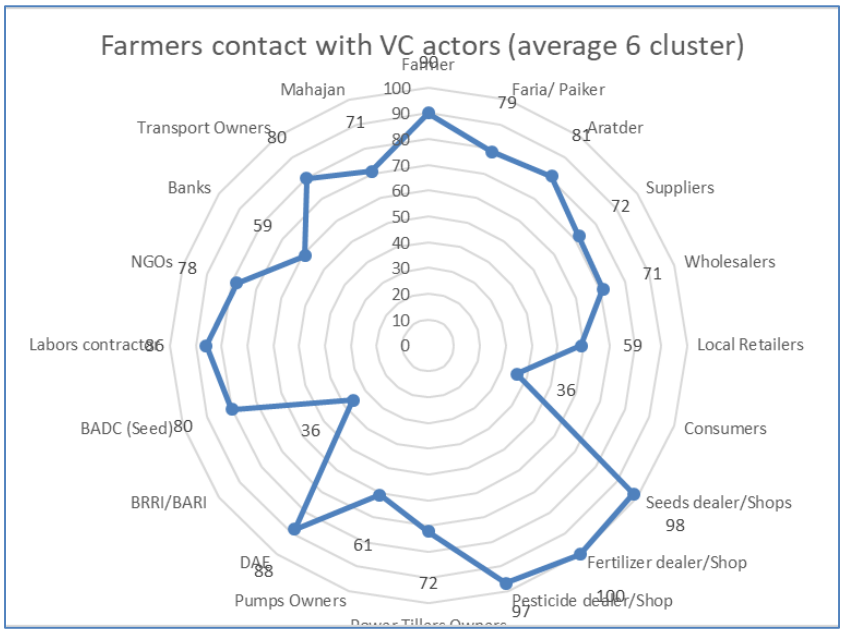


Figure 12: Producers contact with VC actors

80% contact are with Faria/paiker (79%), NGOs (78%), suppliers and power tiller owners (72%) and wholesaler and Mohajans (71%). The contact with the pump owners was 61%. Fifty percent farmers had contact with local retailers and Banks. The least contacts of the farmers were with BARI scientists (59%) (Table 17).

Table 17: **Producers' contact with VC Actors (%)**

No	Value Chain Actors	Brinjal	Tomato	Bitter Gourd	Sweet Gourd	Banana	Aromatic Rice	Average (%)
1	Farmer	97	94	94	81	88	87	90
2	Faria/ Paiker	83	83	76	76	77	80	79
3	Aratder	80	80	80	73	87	87	81
4	Suppliers	77	74	71	64	68	80	72
5	Wholesalers	77	70	70	60	73	75	71
6	Local Retailers	70	60	60	47	63	53	59
7	Consumers	33	33	39	32	42	34	36
8	Seeds dealer/Shops	99	99	100	90	100	100	98
9	Fertilizer dealer/Shop	100	100	100	97	100	100	100
10	Pesticide dealer/Shop	100	100	100	90	98	93	97
11	Power Tillers Owners	81	74	67	67	67	73	72
12	Pumps Owners	73	60	60	58	54	60	61
13	DAE (SAAO/UAO)	94	94	93	76	86	87	88
14	BRRI/BARI (Scientists)	50	50	43	26	44	0	36
15	BADC (Seed)	94	93	93	77	53	67	80
16	Labors contracting Groups	90	90	90	80	83	80	86
17	NGOs	87	83	74	77	74	75	78
18	Banks	57	53	60	57	66	60	59
19	Transport Owners	83	83	83	80	77	73	80
20	Mahajan	74	77	67	73	64	73	71

- **Producers Contract with VC actors**

The FGD meetings also revealed the frequency of the producers' contract farming with the value chain actors expressed verbally. There was no written or MOU and therefore no proof. Farmers/producers went into contract farming with 13 different VC actors. Sixty percent of the brinjal farmers had agreement with pump owners, 63% with Faria/Paikers and 67% with Aratders. Fifty or more than 50% went into contract with fertilizer dealer (50%), pesticide dealer, labour contracting groups and Mahajans (53%) and power tiller owners (57%). The wholesalers, suppliers and seed dealers also came into contract with 40 to 47% farmers. The least contract farming brinjal producers (17%) went in contract with local retailers.

A high number of tomato producers (73%) went into contract with Farias and Paikers. Besides, 60% carried out contract farming with Aratder and Mohajans. In case of bitter gourd and sweet gourd producers a highest percentage (77%) went into contract farming with Farias and Paikers. However, the Aratders attracted attention of 80% of bitter gourd producers. A large proportion (70%) of sweet gourd farmers also went into contract farming with Mohajans. A

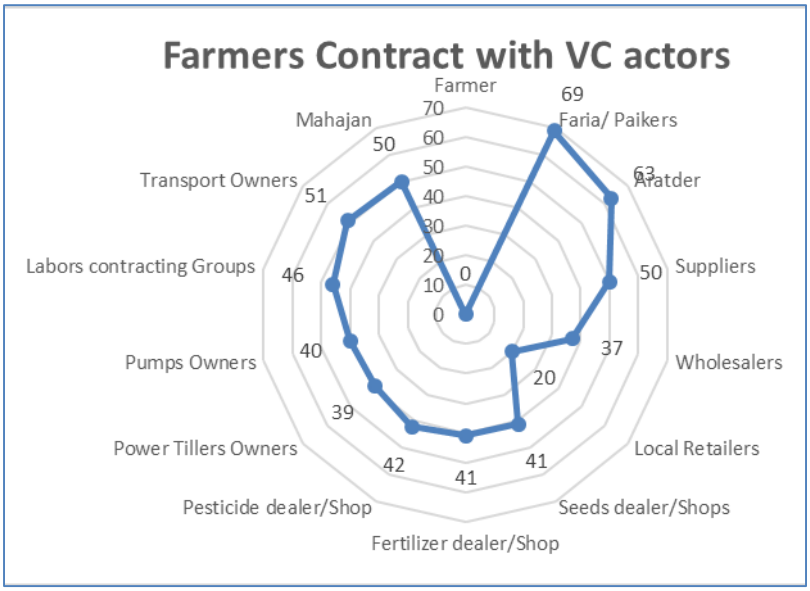


Figure 13: Farmers contract with VC actors

highest percentage (63%) of banana growers carried out contract farming with Aratders, followed by 53% with Farias/Paikers and Transport owners. The aromatic rice producers in the range of 73% chose the Farias and Paikers as their partners in contract farmers. Rice growers (53%) also went into contract with Aratder and labour contracting groups.

An overall average shows that VC producers preferred Farias/Paikers (69%) and Aratders (63%) for contract farming. Fifty percent preferred suppliers and Mohajans. A percentage of 41 to 42% of all producers went with seed, fertilizer and pesticide dealers. The least involvement was that of the retailers with whom only 20% farmers went for contract farming (Figure 13)

Table 18: Producers' type of contract farming with VC Actors (%)

No	Value Chain Actors	Brinjal	Tomato	Bitter Gourd	Sweet Gourd	Banana	Aromatic Rice	Average (%)
1	Farmer	0	0	0	0	0	0	0
2	Faria/ Paikers	63	73	77	77	53	73	69
3	Aratder	67	60	80	53	63	53	63
4	Suppliers	47	53	67	43	43	47	50
5	Wholesalers	40	37	40	37	37	33	37
6	Local Retailers	17	20	23	17	20	20	20
7	Seeds dealer/Shops	47	43	47	37	30	40	41
8	Fertilizer dealer/Shop	50	40	30	30	53	40	41
9	Pesticide dealer/Shop	53	50	27	30	47	47	42
10	Power Tillers Owners	57	47	30	27	40	33	39
11	Pumps Owners	60	37	43	23	43	33	40
12	Labors	53	43	67	23	37	53	46
13	Transport Owners	57	40	63	43	53	47	51
14	Mahajan	53	60	37	70	47	33	50

- **Farmers' Depth of Relationship with VC Actors**

The depth of relationship was expressed in percentage from FGD studies. These are verbal expressions of the farmers between them or with the 20 different VC actors. The seed, fertilizer and pesticide dealers had come in close contact with 99 to 100 percent of vegetable and banana farmers. Other trusted value chain actors are DAE (average of 74% farmers), Labours contracting groups (Average of 73% farmers), BADC (69%), transport owners (68%), NGOs and suppliers (67%) and Faria/Paikers (66%). Except for a small percentage of (15%)

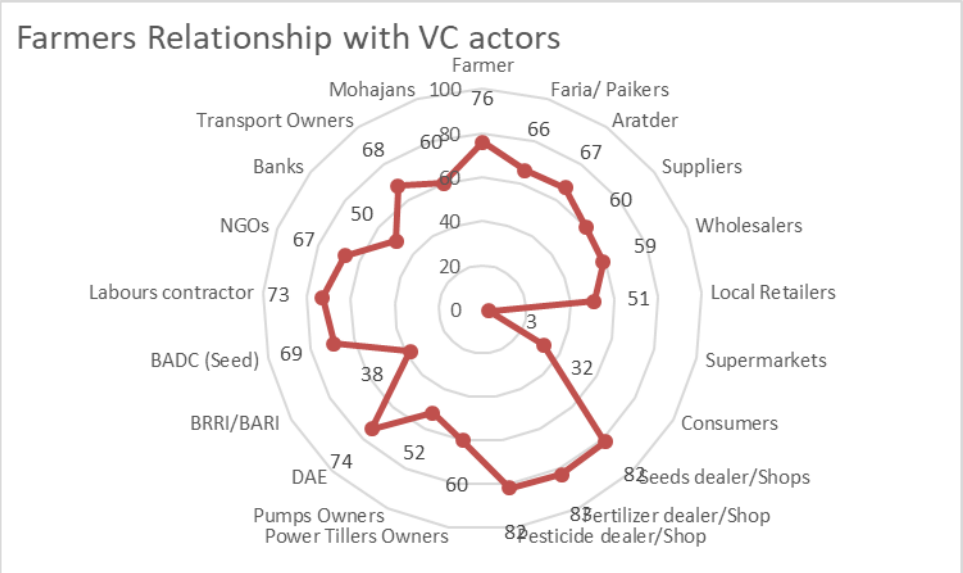


Figure 14: Farmers Relationship with VC actors

aromatic rice producers, none of the VC crop producers had any relationship with the supermarkets (Table 19, Figure 14).

Table 19: **Farmers' Depth of Relationship with VC Actors (% Farmers)**

No	Value Chain Actors	Brinjal	Tomato	Bitter Gourd	Sweet Gourd	Banana	Aromatic Rice	Average (%)
1	Farmer	97	94	94	81	88	2	76
2	Faria/ Paikers	83	83	76	76	77	3	66
3	Aratder	80	80	81	73	87	2	67
4	Suppliers	77	74	71	64	68	3	60
5	Wholesalers	76	70	70	60	73	4	59
6	Local Retailers	70	60	59	46	63	7	51
7	Supermarkets	0	0	0	0	0	15	3
8	Consumers	32	33	40	33	43	10	32
9	Seeds dealer/Shops	100	100	100	90	99	0	82
10	Fertilizer dealer/Shop	100	100	100	97	100	0	83
11	Pesticide dealer/Shop	101	101	101	90	98	1	82
12	Power Tillers Owners	80	74	66	67	67	4	60
13	Pumps Owners	73	60	60	57	54	6	52
14	DAE(SAAO/UAO)	93	94	93	77	86	2	74
15	BRRI/BARI (Scientists)	50	50	43	26	44	15	38
16	BADC (Seed)	94	93	93	76	53	5	69
17	Labours contracting Groups	90	90	90	81	84	3	73
18	NGOs	87	83	74	77	74	4	67
19	Banks	57	53	60	56	66	6	50
20	Transport Owners	83	83	83	80	77	4	68
21	Mohajans	73	77	67	73	63	5	60

- **Farmers Level of Trust o VC actors**

The FGD meetings also led to discussions on the level of trust of farmers on the VC actors. The data expressed as percentage shows the feeling of relationship. The trust level on an average ranged from 59 to 100% level among farmers attending the FGD meetings. One hundred percent farmers trusted fertilizer dealers, 98% seed and 97% pesticide dealers and shops. A high level of trust (average of 88% farmers) also existed with DAE (SAAO/UAO) and labour contracting groups (86%). All farming groups seem to have low level of trust (33-43% farmers) on the consumers (Table 20).

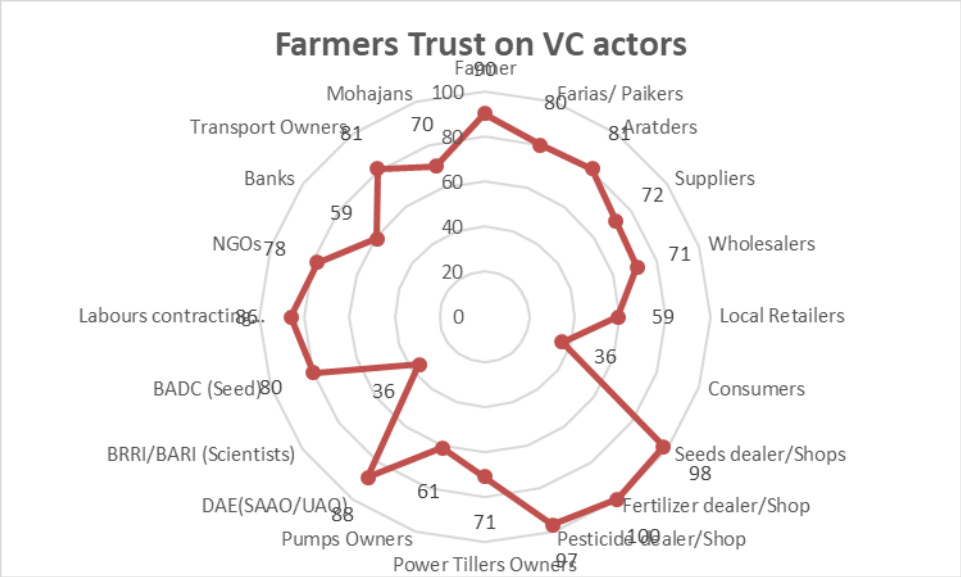


Figure 15: Farmers Level of trust on VC actors

Table 20: **Farmers' Level of trust on VC Actors (Percentage)**								
No	**Value Chain Actors**	**Brinjal**	**Tomato**	**Bitter Gourd**	**Sweet Gourd**	**Banana**	**Aromatic Rice**	**Average (%)**
1	Farmer	96	95	93	81	87	88	90
2	Farias/ Paikers	84	83	77	77	77	81	80
3	Aratders	80	80	80	74	86	87	81
4	Suppliers	76	73	70	63	67	80	72
5	Wholesalers	77	70	70	60	73	74	71
6	Local Retailers	70	60	60	47	65	54	59
7	Consumers	33	33	40	33	43	34	36
8	Seeds dealer/Shops	100	100	99	90	100	100	98
9	Fertilizer dealer/Shop	100	100	100	97	100	100	100
10	Pesticide dealer/Shop	100	100	100	91	97	93	97
11	Power Tillers Owners	80	74	67	66	67	74	71
12	Pumps Owners	73	60	59	57	53	61	61
13	DAE(SAAO/UAO)	93	93	93	77	86	87	88
14	BRRI/BARI (Scientists)	51	50	42	26	44	0	36
15	BADC (Seed)	94	93	93	76	54	67	80
16	Labours contracting Groups	90	90	90	80	83	80	86
17	NGOs	87	83	74	77	74	74	78
18	Banks	57	53	60	56	67	60	59
19	Transport Owners	84	84	84	81	77	74	81
20	Mohajans	74	77	67	74	64	66	70

- **Learning Modern Technologies of Production of VC Products**

The FGD facilitators wanted to know about the farmers' learning on 6 different value chains about modern technologies of farming. The overall learnings were good as an average of 75% to 88% of VC farmers knew about the modern cultivation practices. All aromatic rice farmers (100%) attending the group discussions, expressed that they had knowledge about techniques of modern cultivation. Farmers were mostly learned about post-harvest practices about then 80% in all brinjal, tomato, bitter gourd and banana; little lower in sweet gourd 77%, farmer also learned about good packaging over 80%, good and safe transportation also over 80% farmers learnt about this. Little lower number of farmers (below 80%) learning on marketing and market information.

Table 21: Learning Modern Technologies of Production of VC Products							
	Learnings	Brinjal	Tomato	B.Gourd	S.Gourd	Banana	A.Rice
1	Vegetable post-harvest practices	87	87	90	77	80	87
2	Modern Cultivation technology	77	80	73	70	77	100
3	Techniques of Marketing	73	70	80	67	70	87
4	Modern packing	83	87	83	77	83	67
5	Use of safe transport of vegetables	90	93	90	80	87	87

- **Problems in line with the selected VC produces**

Discussions during FGDs to identify problems in production and marketing along with the VC. Most farmers (94%) raised the problem of high transportation cost. Lack of market linkage and market relevant information about 84% thus they faced lower profit. Similarly, inappropriate packaging materials like plastic caret, insufficient space and equipment's restrict quality of post-harvest management to get good price in the market in selected VCs. Pest infestation was a problem for 87% of rice and tomato farmer and 83% by brinjal growers. Above 70% famers expressed their concern of pest attack in bitter gourd, sweet gourd and banana. Insufficient number crate for product transport was a problem mentioned by an average of 84% VC farmers. Insufficient space for sorting, grading of products and no direct linkage to market was faced by a high percentage (83 to 84%) of the VC farmers (Table 22).

Table 22: Problems of VCs								
	Problems	Brinjal	Tomato	B. Gourd	S. Gourd	Banana	Rice	Overall
1	Pest infestation	83	87	73	70	77	87	80
2	Insufficient plastic crate for vegetable transport	80	90	77	77	80	100	84
3	Insufficient space and equipment's for washing, sorting, grading etc.	93	83	83	73	73	93	83
4	No direct market linkage to get profitable price	90	77	80	87	87	80	84
5	Transportation cost is high	97	93	97	93	90	93	94

- **Support required for farmers along with VC strengthening**

The farmers also gave their opinion on the support needed to produce and market the VC products. The highest support need as expressed by 91% farmers was the need to have a direct linkage with the buyers along with appropriate market information. Ninety percent of bananas, 93 percent of brinjal and sweet gourd farmers also believe the need of support of linkage to buyers. The support of CCMC was felt necessary for input supply, cooling and washing sorting and grading by 84, 82 and 82% of the producers, respectively.

Table 23: **Support required for Production of VC Products**								
	Support Needed	**Brinjal**	**Tomato**	**B. Gourd**	**S. Gourd**	**Banana**	**A. Rice**	**Overall**
1	Inputs Supply through CCMC	90	87	77	83	77	87	84
2	Cooling/ Refer van for vegetable transport for CCMC	80	90	80	67	80	93	82
3	Need Plastic crate for each CIG members	93	87	80	70	73	93	83
4	Washing place, sorting & grading table in CCMC	90	77	73	83	87	80	82
5	Make direct linkage with buyer (Paiker, Aratder, exporter)	93	97	83	93	90	87	91

3.7.2 Traders Interview

- **Status of having Trade license by the VC actors (traders)**

The VC actors were inquired about the possession of trade license which develops trust and confidence from the business community. Out of the 6 supermarkets all had trade license. The highest possessor of trade license was the Aratder (67%) where 8 out of 12 interviewed had trade license. The retailers (17%) were the least number possessing trade license. However, 50% of the suppliers and 42% of Paiker have license. Thirty-three percent of the Farias and wholesalers possess trade license.

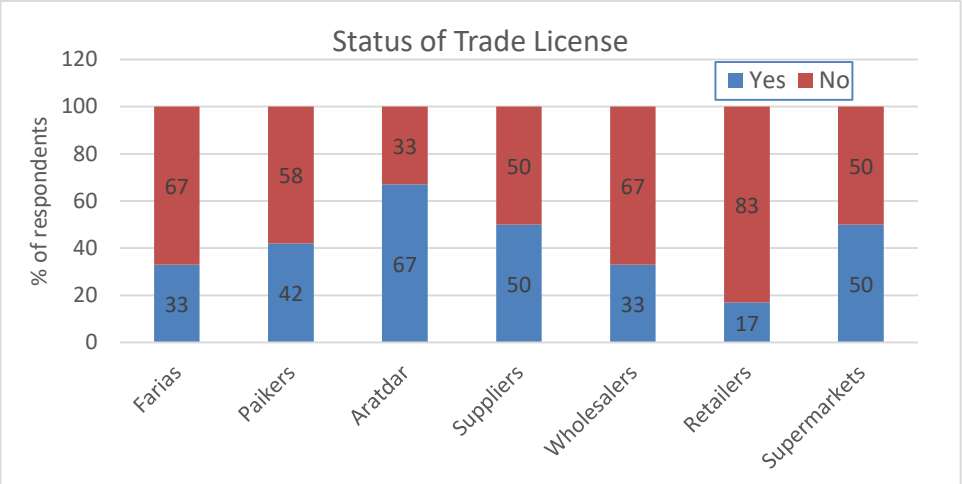


Figure 16: Status of the Trade License for VC actors

- **Cost progression of selected VCs**

The buying price of the 6 VC crops was compiled from KII study of the 6 value chain actors. Incidentally, all the VC actors under survey bought the products from the farmers at the same fixed price of a particular crop. Brinjal has a starting cost of Faria (purchased from farmers) at Tk.18/kg paiker purchased Tk.20/kg from faria, aratder or large scale supplier purchased at Tk.23/kg, wholesaler in regional market or in Dhaka Tk.2 increases up to the Paiker level and Tk.23 in Supplier. From the supplier to wholesaler, there is a Taka purchased at 25/kg and retailer purchased from wholesaler/ aratder at Tk.27 and sold to consumer around Tk.35/kg. There is difference in Taka10/Kg from farmer to wholesaler. An increase of Taka 11 was observed in tomato, 11 in bitter gourd, Taka 10 in sweet gourd, Taka 8 in banana and Taka 25 in case of aromatic rice. A 10% to 25% increase in buying price was observed at the wholesaler's end of the value chain.

Table 24: **Cost progression of selected VCs**

VC crops	Buying Price (Tk./Kg)							
	Farmers	Farias	Paiker	Aratder	Suppliers	Wholesalers	Retailers	Consumer
Brinjal	8.4	18	20	23	23	25	27	33
Tomato	7.7	17	19	23	26	26	28	34
Bitter Gourd	7.6	17	20	23	26	26	28	35
Sweet Gourd	6.3	11	13	16	18	18	21	25
Banana	9.5	20	22	24	26	26	28	35
Aromatic Rice	26.5	40	42	45	47	47	55	70

Table 25: Price and Value Addition at Different level of VCs

Actors	Brinjal	Pumpkin	Tomato	Bitter gourd	Banana	Aromatic Rice
Farmers	18	11	17	17	20	40
Faria	20	13	19	19	22	42
Aratder	21	14	21	22	23	45
Dhaka Paiker	23	17	23	24	24	46
Dhaka Aratder	25	18	26	26	26	47
WS/Dhaka Paiker	27	21	28	28	28	55
Retailer	33	25	34	35	35	70

As per the market system in the market there were some cost associated along with the value chains, it includes handling, commission, logistics, facilities and transportation, however in brinjal VC such was about Tk.9.6 per kg, where tomato Tk.9.8, bitter gourd Tk.8.8, sweet gourd Tk.9.1, banana Tk.9.55 and aromatic rice Tk.15 per kg.

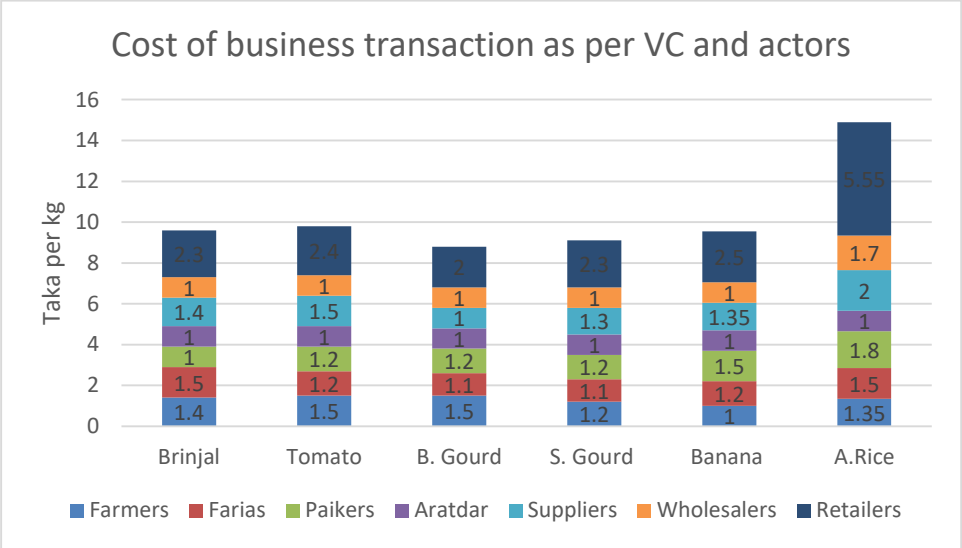


Figure 17: Cost of business transaction as per VC and actors

- **Cost of Sales for value addition activities:**

The total cost of all 8 post-harvest activities of each crop differed slightly. According to the VC actors it was Taka 4.93/kg for brinjal, Taka 5.08/kg for tomato, Taka 4.69/Kg for bitter gourd, Taka 4.71/Kg for sweet gourd, Taka 4.87/Kg for banana and Taka 5.05/Kg for aromatic rice (Table 26). Most of the cost are related to transportation for all value chains

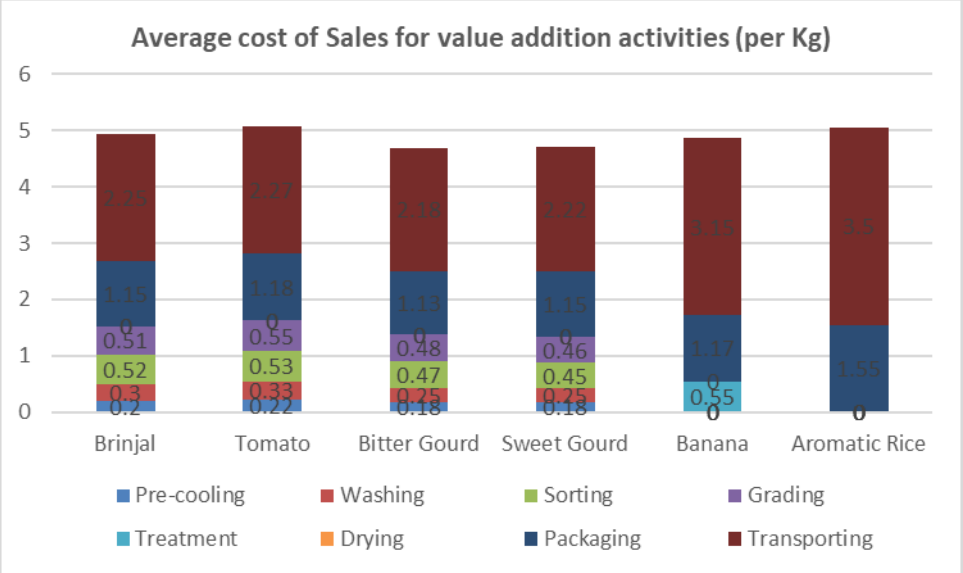


Figure 18: Cost value addition of selected VCs

Table 26: **Average cost of Sales for value addition activities (per Kg)**

	Activities	Brinjal	Tomato	Bitter Gourd	Sweet Gourd	Banana	Aromatic Rice
1	Pre-cooling	0.2	0.22	0.18	0.18	0	0
2	Washing (when needed)	0.3	0.33	0.25	0.25	0	0
3	Sorting	0.52	0.53	0.47	0.45	0	0
4	Grading	0.51	0.55	0.48	0.46	0	0
5	Treatment	0	0	0	0	0.55	0
6	Drying	0	0	0	0	0	0
7	Packaging	1.15	1.18	1.13	1.15	1.17	1.55

Table 26: **Average cost of Sales for value addition activities (per Kg)**							
	Activities	**Brinjal**	**Tomato**	**Bitter Gourd**	**Sweet Gourd**	**Banana**	**Aromatic Rice**
8	Transporting	2.25	2.27	2.18	2.22	3.15	3.5
	Total	**4.93**	**5.08**	**4.69**	**4.71**	**4.87**	**5.05**

- **Employment engagement on post-harvest activities**

The VC actors interviewed through KII gave their estimation as experienced on the labour requirement 8 post-harvest activities. The farmers, Farias, Aratder and Suppliers reported the engagement of 18 labourers for precooling and washing. The VC actors reported differential number of labour engagement for sorting; famers, Paiker and Suppliers view was 41, Farias thought 31 and Wholesalers and retailers stated 23 labour requirement for sorting Except for the Aratder statement of 59 labour requirement for grading all other VC actors stated the same number as that of sorting. The Wholesalers and Retailers stated the requirement of 23 labours for packaging whereas the other actors thought 52 to 53 labour are needed. In case of transportation the requirement of labour is the highest the numbers ranging from 46 to 114 person (Table 27).

Table 27: Employment for value addition								
	Activities	**Farmers**	**Farias**	**Paiker**	**Aratder**	**Suppliers**	**Wholesalers**	**Retailers**
1	Pre-cooling	18	18	18	18	18	0	0
2	Washing	18	18	18	18	18	0	0
3	Sorting	41	39	41	47	41	23	23
4	Grading	41	39	41	59	41	23	23
5	Treatment	0	0	0	0	0	0	0
6	Drying	6	0	0	0	0	0	0
7	Packaging	52	53	53	53	53	35	35
8	Transporting	104	104	104	114	106	51	46
Total		**280**	**271**	**275**	**309**	**277**	**132**	**127**

- **Learning on Modern Technologies of Trading of VCs**

In case of use of modern post-harvest technologies, the VC actors also had gained some knowledge. Their learning was expressed in the KII interviews. Brinjal is the crop on which the traders learnt about chlorine wash 75%, 100% sorting grading, packaging, over 80% respondents mentioned that they learnt about packaging. Fifty-nine per cent had knowledge on tomato packing and 83% had learning on sorting, grading, use of plastic caret and maintaining quality. In case of bitter gourd, the 100% VC actors knew sorting and grading. Knowledge on sweet gourd technologies was observed to be similar to tomato. The knowledge on banana post-harvest processing was known by 50 to 91% VC actors. In case of aromatic rice, 50% of the VC actors had learning on sorting, grading and use of plastic caret (Table 28).

Table 28: **Learning Modern Technologies of Trading of VC Products**							
	Technologies	**Brinjal**	**Tomato**	**Bitter Gourd**	**Sweet Gourd**	**Banana**	**Aromatic Rice**
1	Chlorine wash	75					
2	Sorting, Grading	100	83	100	83	91	50
3	Use of plastic caret	100	83	100	83	83	50
4	Packing while transporting	83	59	67	59	50	
5	Good quality and safe vegetable	67	83	91	91	67	
6	Ripening procedure considering chemical use					75	

- **Problems along with VC actors**

The VC actors were enquired about problem identification in post-harvest activity of 6 VC crops. Most of the respondents stated space problem in carrying out post-harvest activity, insufficient storage facility, no cold storage, insect pest infestation, high cost of labour, high cost of transport, quick rotting of vegetables, unavailability of market and unfair market price.

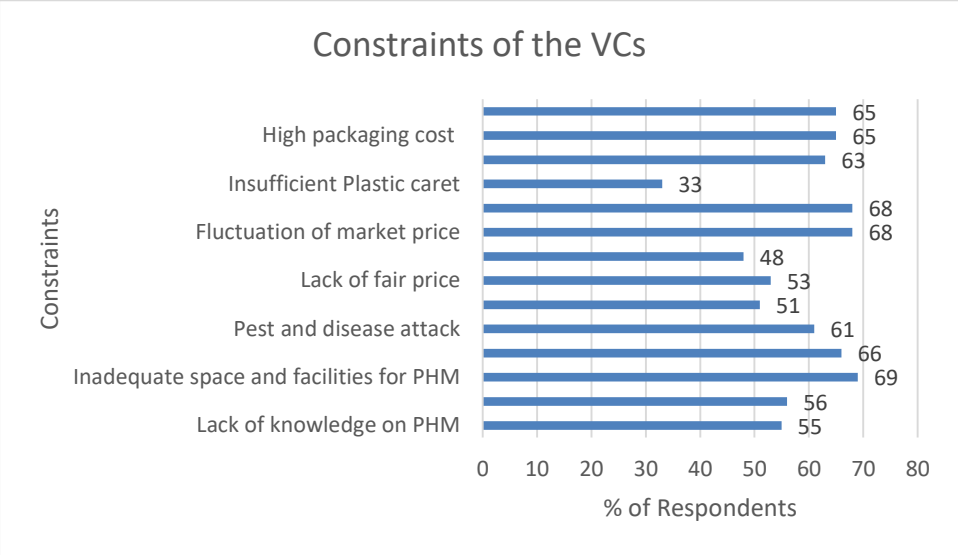


Figure 19: Constraints of VCs

About 70% of the respondent stated that inadequate space and facilities (e.g. space, water, utensils and hygiene sanitation) for the post-harvest activities in the market are the main constraints, followed by high transportation, marketing, labor, packaging cost (65%) was 2nd major restraints the market. Price fluctuation (68%) also another major problem of marketing. Lack of storage facilities (66%), lack of post-harvest knowledge (55%), Insufficient labour (56%) during postharvest management practice, loading and unloading time, 61% disease infested produces, 51% high wastages due perishability hampers to get good market. Additionally, poor market monitoring system also restraints the marketing of the selected VCs.

Table 29: **Constraints of the VCs**

#	Stated problems / constraints	Brinjal	Tomato	Bitter gourd	Sweet gourd	Banana	A.Rice	Overall
1	Lack of knowledge on post-harvest management	65	57	50	59	60	40	55
2	Insufficient labour during postharvest management practice, loading and unloading time	75	50	40	55	75	40	56
3	Inadequate space and facilities for post-harvest activities	67	65	83	83	40	75	69
4	No cold storage system is available near market area	83	91	83	91	25	25	66
5	Pest and disease attack	83	30	50	25	75	100	61
6	High wastage due to handling, rotten, absence of cool chain management	55	100	35	25	83	10	51
7	Lack of fair price	60	100	50	55	45	10	53
8	High post-harvest cost (Sorting and grading)	55	67	55	67	35	10	48
9	Fluctuation of market price	100	50	40	55	83	80	68
10	Transport cost is high	45	75	83	67	59	80	68
11	Insufficient Plastic caret	20	90	90	0	0	0	33
12	High Labour cost	75	50	80	55	75	40	63
13	High packaging cost	67	65	70	70	40	75	65
14	Market monitoring is poor	67	65	75	70	40	75	65

- **Supports to be required for VC strengthening for the market actors**

94% of the respondents were stated that support transport facilities such as refer van, pick up van for CCMC are the most demanding by the traders in the market and CCMC operators followed by government support on marketing (86%) for stable market price, 83% access to institutional financial support to the traders, 76% respondent mentioned that training on appropriate, good quality inputs application (before and after harvest) and 71% stated that area and cluster specific cold storage also help to strengthen the VCs.

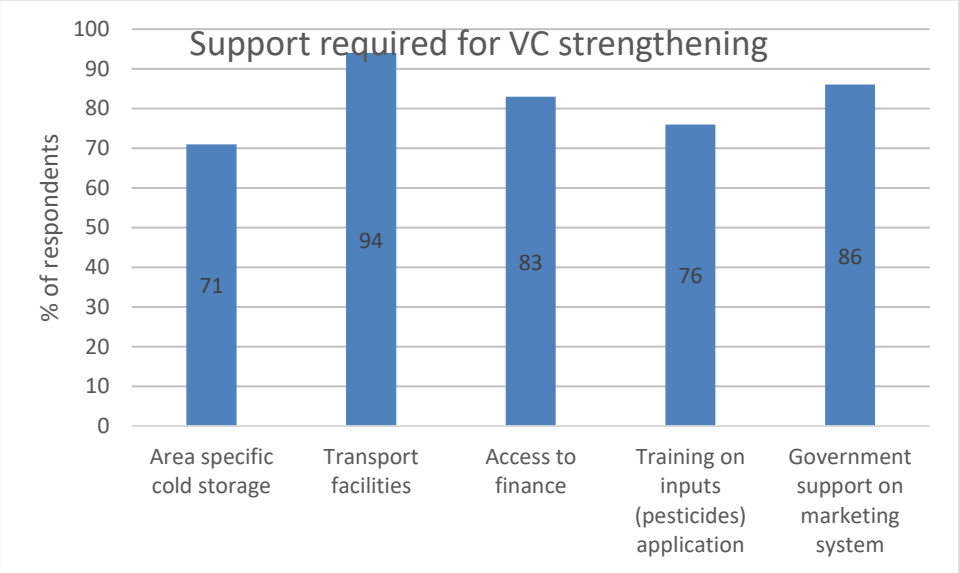


Figure 20: Supports to be required for VC strengthening for the market actors

Table 30: **Support Needed for Trading of VC Products**

#	Support Needed	Brinjal	Tomato	Bitter Gourd	Sweet Gourd	Banana	Aromatic Rice	Overall
1	Area wise mini cold storage	83	75	83	59	67	60	71
2	Support transport facilities such as refer van, pick up van for CCMC	91	100	100	100	91	83	94
3	Facilitate to get bank loan easily at low interest rate	100	100	83	67	83	67	83
4	Training on Insecticide spray procedure and time before & after production/ Harvest	50	100	67	100	50	91	76
5	Need government support to develop marketing system and take initiative for stable market price	100	59	83	75	100	100	86

3.7.3 Selected Cluster wise value chains

3.7.3.1 Tomato

- **Introduction**

The cultivated area under tomato in Bangladesh is 6.81%, average yield 5686 kg/acre, total production 38,8725 tons in 2016-17 (BBS, 2017), which is very low compared to other countries like India (15.67 t/ha), Japan (52.82 t/ha), USA (65.22 t/ha), China (30.39 t/ha), Egypt (34.00 t/ha) and Turkey (41.77 t/ha) (FAO, 2008). The low yield ~~of~~ this crop is responsible for the lower yield attribute viz., unavailability of quality seeds of improved varieties, improper management of fertilizers, irrigation, disease control and lack of suitable pruning practices and appropriate marketing system for tomato. Tomato cultivation amplifies incomes for laborers, empowered women and created new employment opportunities particularly for landless farmers.

Since last decades, tomato production has increased in Bangladesh at an average rate of 11 percent per year, making Bangladesh the third largest tomato producer in South Asia. Even with this growth, Bangladesh continues to import tomatoes to meet summer demand although summer tomato also grown in Bangladesh. In addition to fresh consumption, 5 percent of the industry used for processed food, and this is the fastest growing market segment with growth of about 30 percent per year. Dike-produced tomatoes are generally considered "safer" (at less risk of adulteration because fewer pesticides are applied) and can fetch premium prices from health-conscious consumers if well marketed. During 2013-14 tomato production was 66,626 MT and it raise in 2014-15 to 75,602 MT.

Table 31: Tomato Production in Bangladesh

	2014-15		2015-16		2016-17	
	Area (acres)	Production (M. Ton)	Area (acres)	Production (M. Ton)	Area (acres)	Production (M. Ton)
Bangladesh	75602	413610	67535	368121	68366	388725

Source: BBS, Yearbook of Agriculture 2017

- **Major production and involvement of Hortex in selected areas**

Among 6 tomato clusters Godagari in Rajshahi produced (58595 MT) huge quantity of the tomato in winter season and they have good linkage with the processing companies like PRAN, Sajib and Kishwan. Most of farmer are producing as commercial farming with modern cultivation practices. Other 4 areas (for winter tomato) traditionally produce table tomato used as vegetable and fresh sold to the local market, to faria and/or any traders. Among this South Surma produce most 19550MT followed by chandina 8950MT, Mirsaria 5400MT per year. For summer tomato it is a new crop for the farmers but popularity increasing day by day, due to profitability and proximity, support from DAE however Bagherpara in Jashore produced 7350MT and Jhikorgacha 1800MT tomato in 2016-17 as per DAE records. Hortex involved with 10 CIG each in South Surma and Mirsarai, 12 in Chandina and 20 each in Bagherpara and Jhikorgacha. Every CIG contains 30 farmers.

Table 32: Tomato Production and involvement of Hortex in selected areas

	Tomato	Winter				Summer	
		Chandina	South Surma	Mirrsorai	Godagari	Bagherpara	Jhikogacha
1	Total farmer in Upazila	62750	24850	64965	53760	52100	59185
2	CIG under Hortex	12	10	10	20	20	20
	Total CIG	240	200	200	600	400	400
3	Tomato Farmer	140	1065	900	1020	200	350
4	Cultivated land (ha)	13970	15185	23390	16100	38450	12100
5	Total area Cultivation (ha)	470	145	150	2680	350	150
7	Total production (MT)	8950	19550	5400	58595	7350	1800

- **Production Cycle:**

Varietal improvement and availability of seeds both winter and summer season is suitable for tomato cultivation, considering additional agronomic practices and caring in during summer time. Summer tomato has little higher cost but income also high remarkably. Below chart is an indication for tomato cultivation in selected study areas.

Table 33: Production cycle of tomato

Months	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPP	OCT	NOV	DEC	
	Pous	Magh	Falgoon	Chaitra	Baishakh	Jaistha	Ashar	Srabon	Vadra	Aswin	Kartik	Agrahyan		
Winter														
Seedling														
Main crop														
Summer														
Seedling														
Main crop														

- **Value Chains of the Tomato:**

As per discussion with UAO and SAAO in Jhikorgacha and Bagherpara, approximately 500 farmers are producing summer tomato like as a cluster especially in Bagherpara. CIG and CCMC have good connection both for technology disseminations and marketing of the tomato.

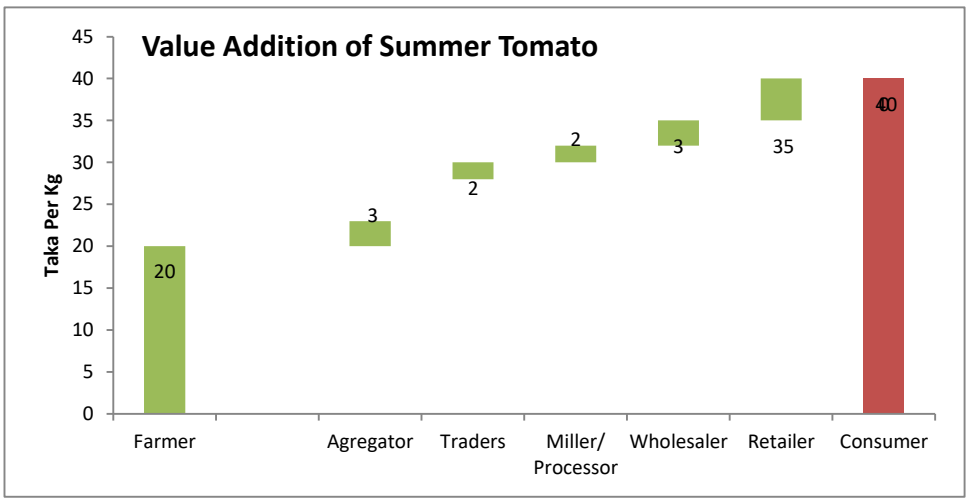


Figure 21: Value Addition of Summer Tomato

Supershops and retailer can get good returns from summer tomatoes. Inputs companies are providing seeds, fertilizers and making money. Supershop like Swapno would get preference to supply safe and quality fresh tomato to the urban consumers. Apart from this industrial variety tomato can promote production and supply of tomato paste using industrial varieties.

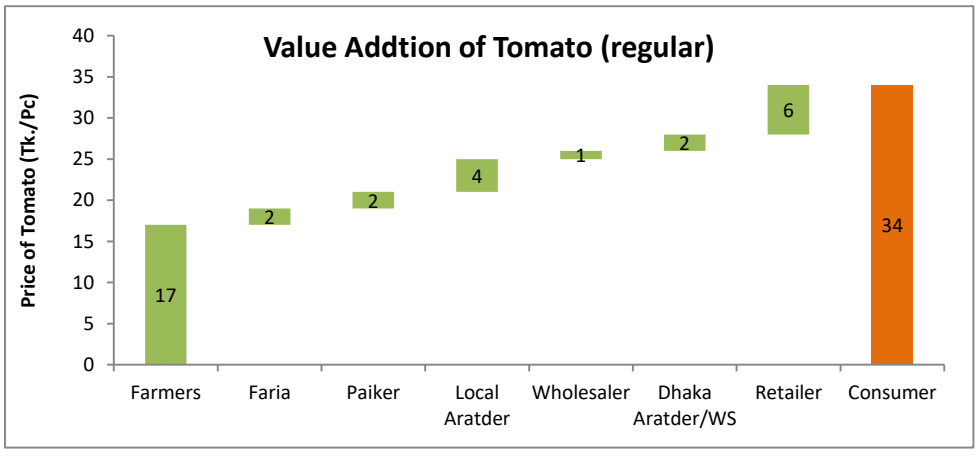


Figure 22: Value progression of winter tomato

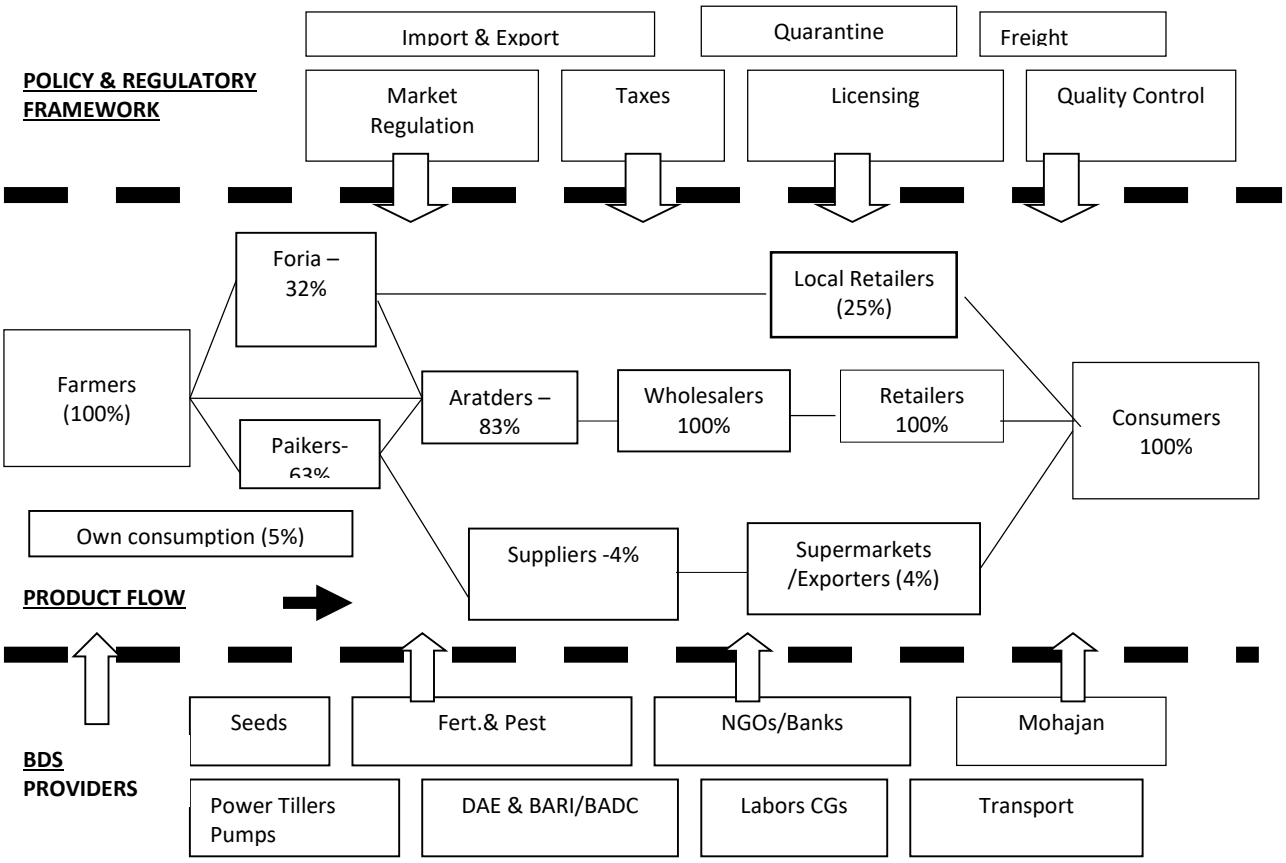
For traditional tomato production cost per kg is Tk.7.7 in average sold in the market Tk.17/kg to the local farias. The value progression has shown in below table:

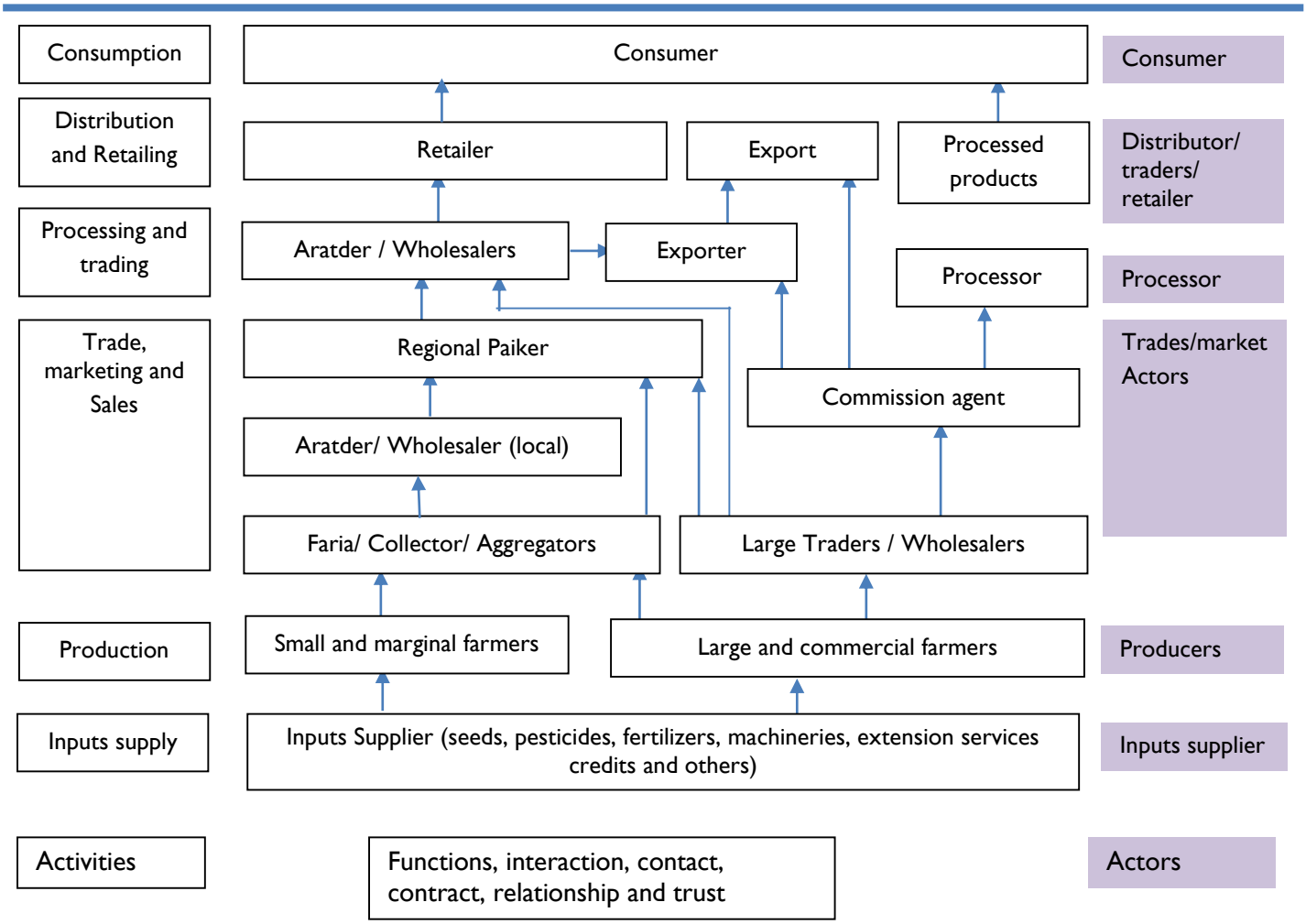
Table 34: Value proposition of tomato							
Value chain Actor	Purchase	Sales	Price difference	Value Addition	% of value addition	Profit	% of Profit
Farmers cost	7.7	17	9.3	7.7	48%	9.3	52%
Faria	17	19	2	1	6%	1	6%
Paiker	19	23	4	2	12%	2	11%
Local Aratder	23	25	2	1	6%	1	6%
Wholesaler	25	26	1	0.5	3%	0.5	3%
Dhaka Aratder/WS	26	28	2	1	6%	1	6%
Retailer	28	34	6	3	19%	3	17%
Consumer	34						

Table 35: Tomato cost price along with different VC actors							
Traders	Farmers	Farias	Paiker	Aratder	Suppliers	Wholesalers	Retailers
Farmers	17	0	0	0	0	0	0
Farias	17	19	0	0	0	0	0
Paikers	17	19	23	0	0	0	0
Aratdar	17	19	23	26	0	0	0
Suppliers	17	19	23	26	0	0	0
Wholesalers	17	19	23	26	26	28	0
Retailers	17	19	23	26	26	28	34

In the value chain actors are available from different large markets and take the product to Dhaka, Rangpur, Sylhet and Chittagong market. Farmers are receiving market information through personal communication over mobile phone and neighbors.

Table 36: Value Addition of Tomato (Fresh)											
Tomato (summer tomato)							Peak Season				
Market Actors	Cost	Value Addition + crate+ wastage+ Transport	Total Cost	Price	Profit		Cost	Value Addition + crate+ wastage+ Transport	Total Cost	Price	Profit
Farmers	10	5	15	20	5		4	3	7	10	3
Faria	20	1	21	25	4		10	1	11	12	1
Local Aratder	25	1	26	28	2		12	0.5	12.5	13	0.5
Dhaka Paiker	28	1	29	30	1		13	3	16	18	2
Dhaka Aratder	30	1	31	32	1		18	0.5	18.5	19	0.5
WS/Dhaka Paiker	32	2	34	35	1		19	1	20	21	1
Retailer	35	2	37	40	3		21	2	23	26	3
Consumer	40						26				
Source:	Field Survey (April 2019)						Market Assessment Survey, Matrix 2017				





Value Chain Map 1: Tomato Value Chain

- **Mutual Contact, Contract, Relation, Trust of Tomato Value Chain**

Contacts:

Farmers have the highest and 100% contact with fertilizer, pesticides, and seed retailer and shop. Farmer to farmer good contact 94%, above 80% contact with the faria, paiker, 74% with suppliers, minimum with retailers. Least contact found with super market 30%. Farmers have contact with DAE 94%, less in research organization like BARI BADC about to 50%. Farmer have good contact with NGOs (63%) and labour contacting groups 90%. The contact with the pump owners was 60%. Contact with transport also high as above 80%. Fifty percent farmers had contact with Banks.

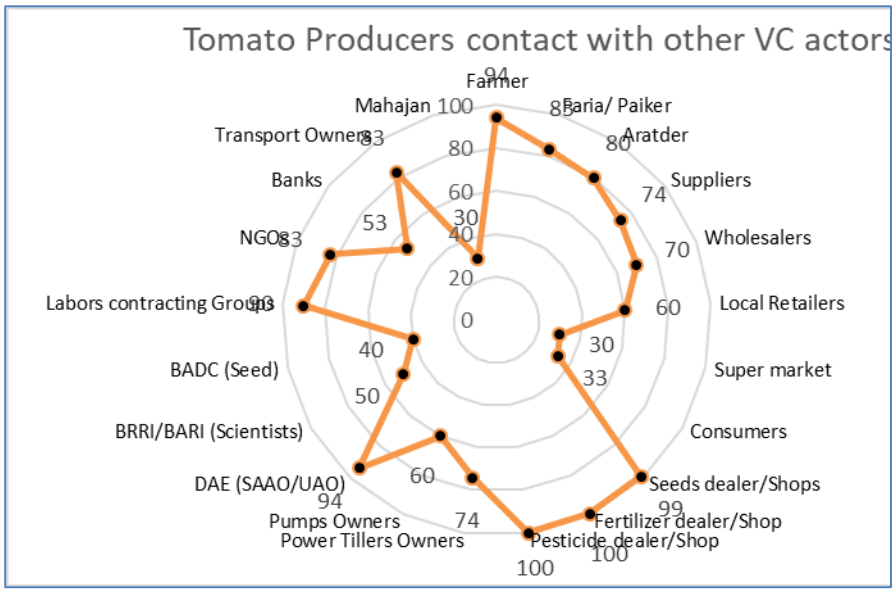


Figure 23: Tomato Producers contact with VC actors

Contract

The FGD meetings also revealed the frequency of the producers' contract farming with the value chain actors expressed verbally, one of the farmers have any formal or written contract with any of the VC actors or even stakeholders. There was no written or MOU and therefore no proof. Farmers/ producers went into contract farming with 21 different VC actors.

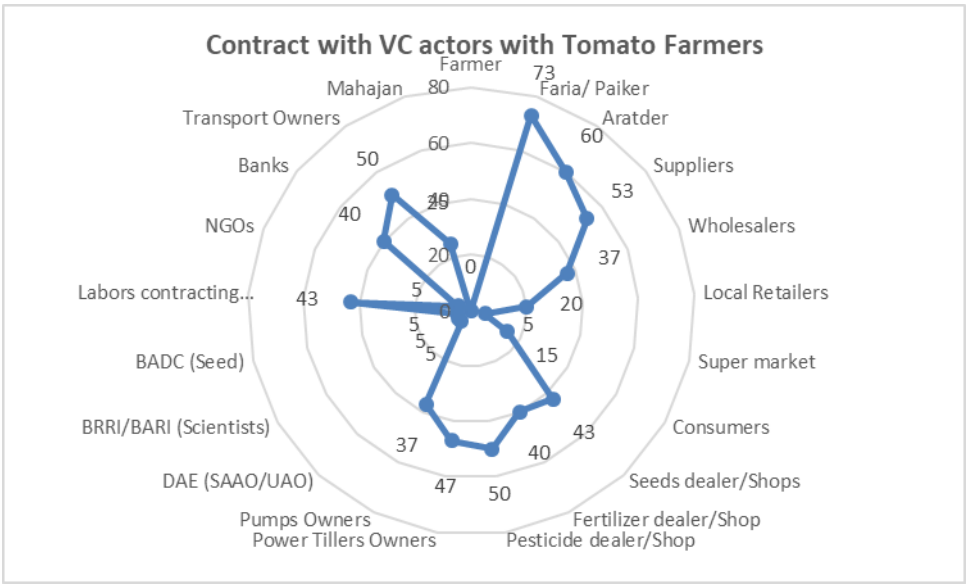


Figure 24: Tomato producers contract with VC actors

A high number of tomato producers (73%) went into contract with Farias and Paikers. Besides, 60% have verbal contract with aratder. With all inputs retailers, banks, and labour contractors have some extent of informal contract below than 50% of the respondents. All research organization, super market has small information about it.

Relationship

The depth of relationship was expressed in percentage from FGD studies. These are verbal expressions of the farmers between them or with the 20 different VC actors. The seed, fertilizer and pesticide dealers had come in close contact with 99 to 100 percent of tomato farmers. Other trusted value chain actors are DAE 94%, Labours contracting groups 90%, BADC (10%), transport owners 83%), NGOs and suppliers 83%, and Faria/Paiker aratder above 80%, very less with super markets 10%, and local retailers 60%.

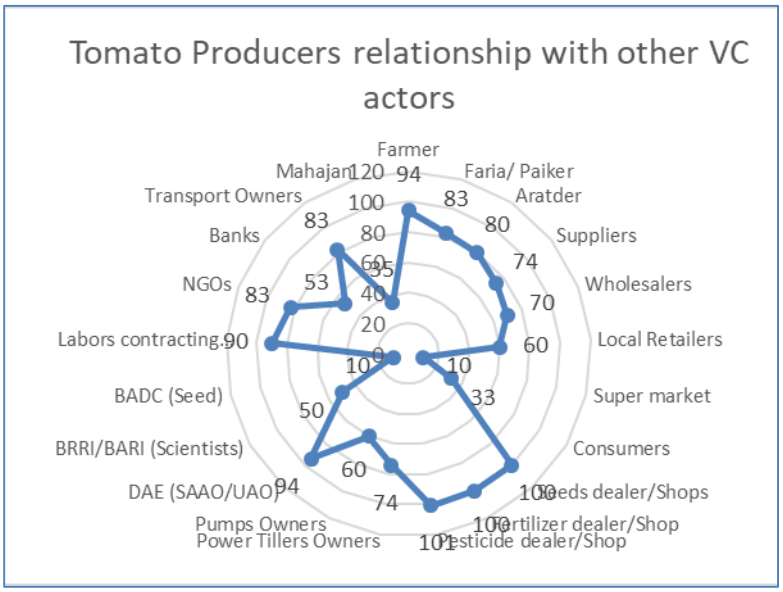


Figure 25: Tomato producers relationship with VC actors

Trust on VC actors

The FGD meetings also led to discussions on the level of trust of farmers on the VC actors. The data expressed as percentage shows the feeling of relationship. The trust level on an average ranged high from 20% to 100% among farmers attending the FGD meetings. One hundred percent farmers trusted fertilizer dealers, seed retailers, and pesticide dealers and shops. A high level of trust on 60% to 88% on faria, paikers, aratder, suppliers and supermarket. On extension service DAE BARI also existed high level of trust above 80%. All farming groups seem to have low level of trust (33%) on the consumers.

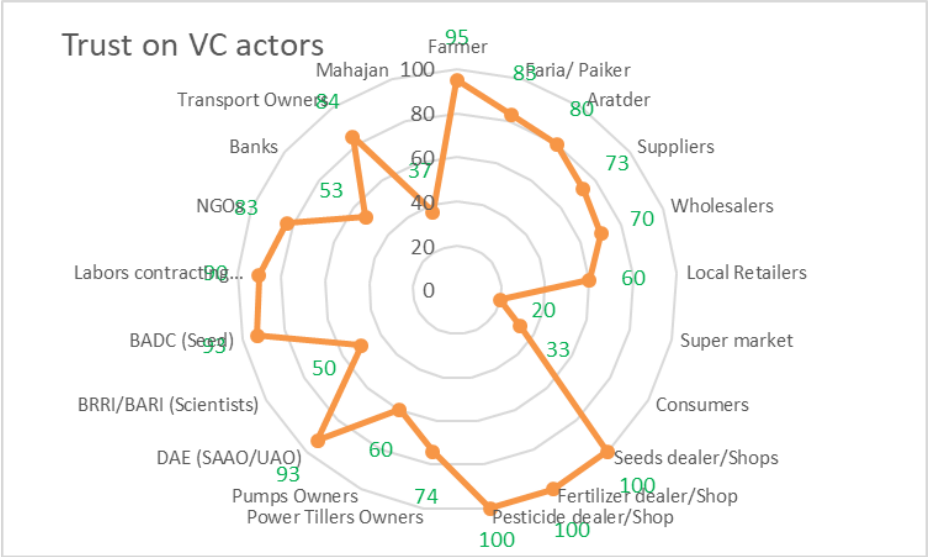


Figure 26: Tomato Producers trust on VC actors

Table 37: Tomato producers contact, contract, relationship and trust upon VC actors					
No	**Value Chain Actors**	**Contact**	**Contract**	**Relationship**	**Trust**
1	Farmer	94	0	94	95
2	Faria/ Paiker	83	73	83	83
3	Aratder	80	60	80	80
4	Suppliers	74	53	74	73
6	Local Retailers	60	20	60	60
	Super market			0	

Table 37: Tomato producers contact, contract, relationship and trust upon VC actors					
No	**Value Chain Actors**	**Contact**	**Contract**	**Relationship**	**Trust**
7	Consumers	33		33	33
8	Seeds dealer/Shops	99	43	100	100
9	Fertilizer dealer/Shop	100	40	100	100
10	Pesticide dealer/Shop	100	50	101	100
11	Power Tillers Owners	74	47	74	74
12	Pumps Owners	60	37	60	60
13	DAE (SAAO/UAO)	94		94	93
14	BRRI/BARI (Scientists)	50		50	50
15	BADC (Seed)	93		93	93
16	Labors contracting Groups	90	43	90	90
17	NGOs	83		83	83
18	Banks	53		53	53
19	Transport Owners	83	40	83	84
20	Mahajan	77	60	77	77

- **Constraints and market based solutions in Tomato Clusters:**

Table 38: Constraints and probable solution of tomato value chain

Sl.#	Constraints	Probable commercially viable solutions
A.	**Technical (pre-production harvesting, post-harvest, and product development)**	
1	Absence of business oriented crop planning (business plan) for commercial vegetable (tomato) production	Training and capacity building of the CIG/CCMC members on business planning as per market demand and contractors requirements
2	Poor quality inputs (seed fertilizer and pesticides)	Facilitate and linkage to get good quality commercial varieties of seed, good quality fertilizer, pesticides (linkage between CCMC and input supplying companies)
3	Pest infestation in high quality vegetable production	Training on disease and pest management of CIG members and CCMCs (linkage between CCMC and input supplying companies)
4	Inadequate knowledge and poor practices on post-harvest management	Training and capacity building on post-harvest management of the CIG members/CCMCs
5	High wastages, rotten of vegetable rapidly, causes wastage then other vegetables	Training and capacity building on post-harvest management of the CIG members/CCMCs
6	Insufficient plastic crate for vegetable transport	Linkage with crate suppliers and transport providers
7	Poor packaging of tomato	Facilitate and training of proper packaging and linkage with packaging materials providers
8	Lack of processing industries in the study area to add value to the products	Linkage with the processing industries for sales and marketing
9	No cool chain mainlining from harvest to consumer market	Facilitate to raise awareness and capacity building on cool chain management Support CCMCs/CIG or enterprises with refrigerated / refer van for transportation and sales
B	**Market Access**	
1	No direct market linkage to get profitable price	Facilitate linkage among the large scale traders, processors and supermarkets with CIG members and CCMCs
2	Lack of fair price	Facilitate to get appropriate market information through ICT and other buyers
3	No contract farming in summer tomato and for winter tomato	Facilitate to start formal contract farming with processors, large scale buyers and exporter
C	**Organization and management**	
1	Inadequate market monitoring	Strengthen market monitoring system by DAM and Hortex together
2	Weak CIG and CCMC coordination with market committees	Facilitate to strengthen relationship trust, and connect with VC actors and market committees
3	No formal contract among the VC actors	Facilitate CCMC and CIG to form contract farming production system with Large scale VC actors with good relationship, contact, and trust
D	**Finance**	
1	Inadequate access to finance for traders and Post-harvest management	Facilitate and advocacy on access to loan for traders with financial institutes
2	Absence of institutional financing in perishable product business for the VC actors	Advocacy and linkage with the relevant financing institutes
E	**Infrastructure**	
1	Transportation cost is high	Facilitate to use cool van, and group transportation system by the CCMCs/CIGs
2	No Cold Storage facilities	Facilitate to establish multipurpose cold storages through private sector enterprises
4	Insufficient space and equipment's for washing, sorting, grading etc.	Facilitate to advocacy with the market committees to allocate more space in the market and widening CCMCs place together
F	**Regulatory**	
1	No quality control and Quality assurance policy	Establish QA/QC cell in the DAE along with Hortex
2	No quality certification agency	GAP and other quality compliances certification system to be established

3.7.3.2 Brinjal:

- **Introduction**

Brinjal, *Solanum melongena of* Solanaceae family is a most popular vegetable in Bangladesh, second only to potato in **production**. It is **grown** on nearly 50,000 hectares. Its **production** provides an important source of cash income for small resource-poor farmers. It is cultivated everywhere in the country for home consumption. Commercial cultivation is highly intensified in certain specific Upazilas

The project has been promoting development of value chain of brinjal cultivation in 6 Upazilas namely in Raipura,andShibpur in Narshingdi. Sreemongal in Moulovibazar, Sadar upazila of Jessore, Islampur Upazila in Jamalpur and Parbatipur Upazila in Dinajpur where generally land is high and soils are calcareous and sandy loam suitable for cultivation of Brinjal' In fact those Upazila are famous for commercial Brinjal cultivation.

Table 39: Brinjal production Bangladesh

Season	Brinjal Area (acres)			Brinjal Production (MT)		
	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15
Winer	69602	73409	76370	236395	310510	310354
Summer	42268	42314	45644	131654	118653	139792
Total	111870	115723	122014	368049	429163	450146

- **Major production of Brinjal and involvement of Hortex in selected areas**

Among 6 tomato clusters Shibpur in Narsingdi has produced (17700 MT) is huge quantity of the brinjal both in winter and summer season, it rationally called as brinjal cluster and they have good linkage Dhaka city markets, inputs and extension services. Most of farmer are producing as commercial farming with modern cultivation practices. In Islampur, Jamalpur and Jashore Sadar also produce large quantity of brinjal 12,250MT and 11550 MT respectively, those also called as brinjal cluster historically. Parbatipur, Dinajpur is a growing area produced 5780MT last year. Fresh brinjal sold to the local market, to faria and/or any traders. Hortex involved with 20 CIGs each in each of the locations (upazila) except Raipura, Narsingdi 13 CIGs. Every CIG have 30 members from the locality.

Table 40: **Major production of Brinjal and involvement of Hortex in selected areas**

#	Target areas	Raipura	Shibpur	Jashore	Islampur	Srimongol	**Parbatipur**
1	Total farmer in Upazila:	205597	49439	85500	61000	29414	79609
2	CIG under Hortex Foundation	13	20	20	20	20	20
	Total CIG	390	600	400	600	400	400
3	Brinjal Farmer	2142	1535	3000	1400	1050	1860
4	Cultivated land (ha)	23685	16100	3500	10250	21615	30137
5	Total area of Brinjal Cultivation (ha)	238	410	385	610	82	289
7	Total Brinjal production (MT)	4760	17700	11550	12250	1891	5780
Source: DAE, respective upazila							

- **Major production and marketing practices**

Brinjal is produced in both winter and summer seasons. In winter production process begins with seed bed during 15th of July to 15th of September and planting of seedling began in mid-August and fruiting starts in two months' time and are harvested in another one month's time. The winter production cycles continue till mid-January Table below. In winter about 80% farmers of the Upazilas cultivate Brinjal.

- **Production Cycle of Brinjal**

Table 41: Production cycle of Brinjal

Months	DEC / Pous	JAN / Magh	FEB / Falgoon	MAR / Chaitra	APR / Baishakh	MAY / Jaistha	JUN / Ashar	JUL / Srabon	AUG / Vadra	SEPP / Aswin	OCT / Kartik	NOV / Agrahyan	DEC	
Winter														
Seedling														
Main crop														
Summer														
Seedling														
Main crop														

In summer production process starts in Mid-March when seeds are sown in seed bed and continue till in April. Planting begin in mid-April and the summer crop cycle continues till mid-December

The research found that brinjal production is a profitable enterprise. Human labor, seed cost, MoP and pesticides cost are statistically significant effects on brinjal production. Costs of human labor and chemical fertilizers were occupied the major share of total cost of brinjal production. According to BCR calculation, the benefit of brinjal production at the sample area was three times more compare to the total cost. Though it is a profitable business, it could have more extended the business if the farmers are having close contact with the agricultural extension services, getting good marketing and transport facilities.

- **Value Chains of the Brinjal:**

As per discussion with producers, traders, CIG members, CCMC representative and other VC actors UAO and SAAO in the selected brinjal clusters it was found that in every upazila there are plenty of brinjal are producing. It has established market, market chain. Traders are doing multiple product business along with other vegetable they trade brinjal. But farmers are dedicated to brinjal for long time. Some farmers do the brinjal cultivation for last 25 years, someone just for last 5 years. Usually producers harvest / pick brinjal twice in a week and sale nearby market, or to the local traders called faria/ Paiker. Some time they sold from their field also. Local faria and Paiker sold to the nearby market to the regional large trader via Aratder. Aratder take some sales commission or some do trade themselves. Regional trader they used to come from Dhaka or local trader also do the regional trade. These regional traders brought to Dhaka market (or regional large market) sale to another trader via another aratder. These traders may be retail or some of large buyer again sale to the retailer. Retailer sale direct to consumer. In Dhaka in between there are supplier purchased brinjal from Aratder/wholesaler and supply to the super markets or to the restaurants. In every steps of the transaction there are transaction cost, grading sorting, transportation, profit/loss, other overhead e.g. labour, rent, commission etc. Those are selling to super shop usually they do the little more post-harvest work like cleaning, grading and sometimes packaging. Hence CCMC can take the market opportunity direct to supply super shops or large level wholesale buyer.

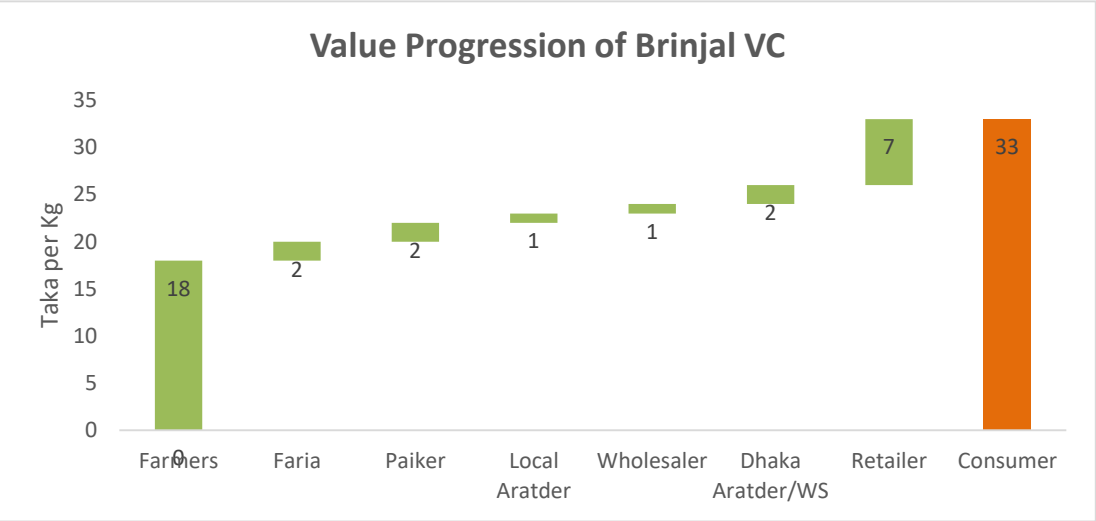


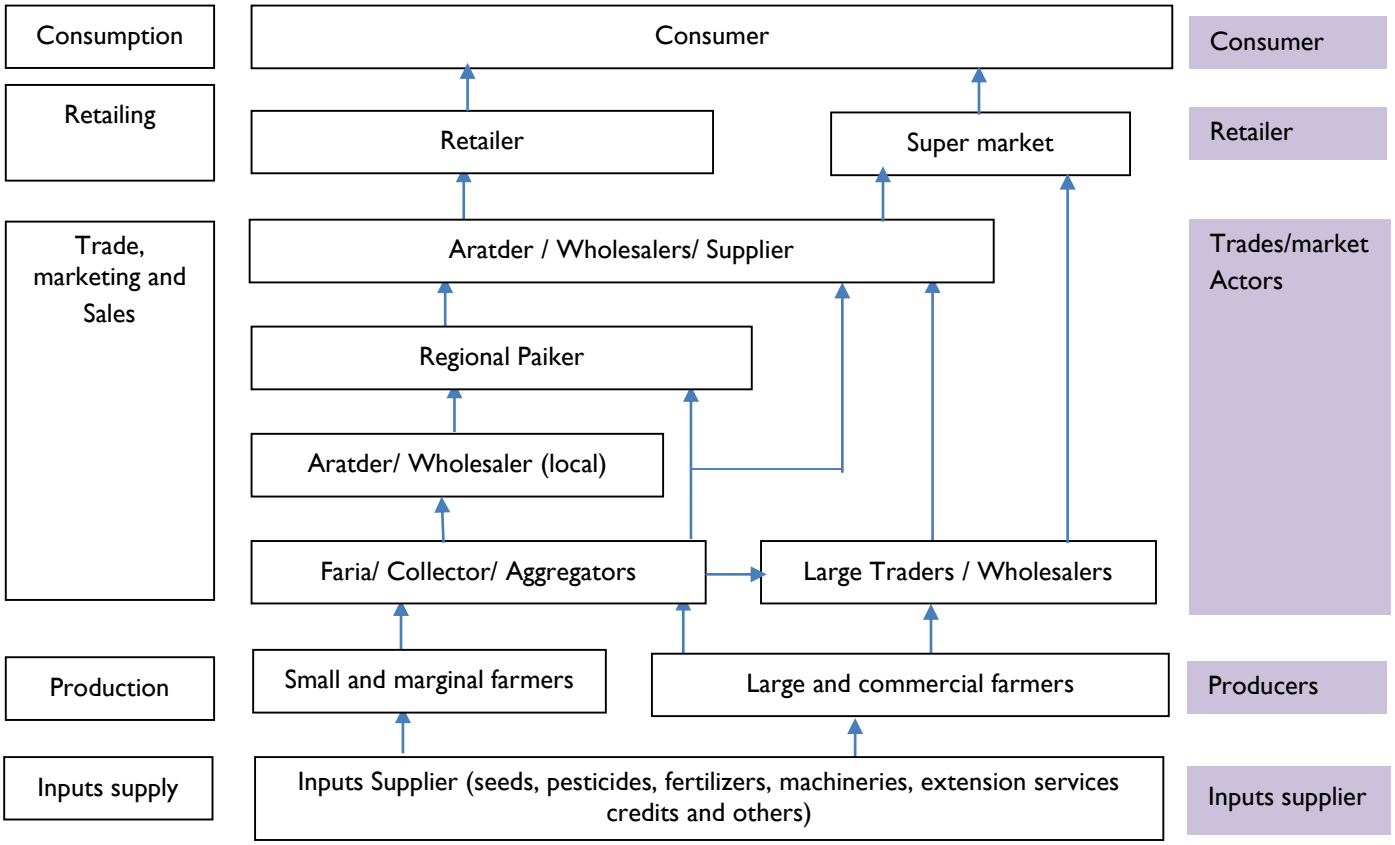
Figure 27: Value progression of Brinjal VC

From the market scenario if climatic condition and market dynamics is normal farmers are getting more profit (54%) than anyone else in the value chain, producers are also adding value more 54%. The value progression along with brinjal value chain as shown in below table

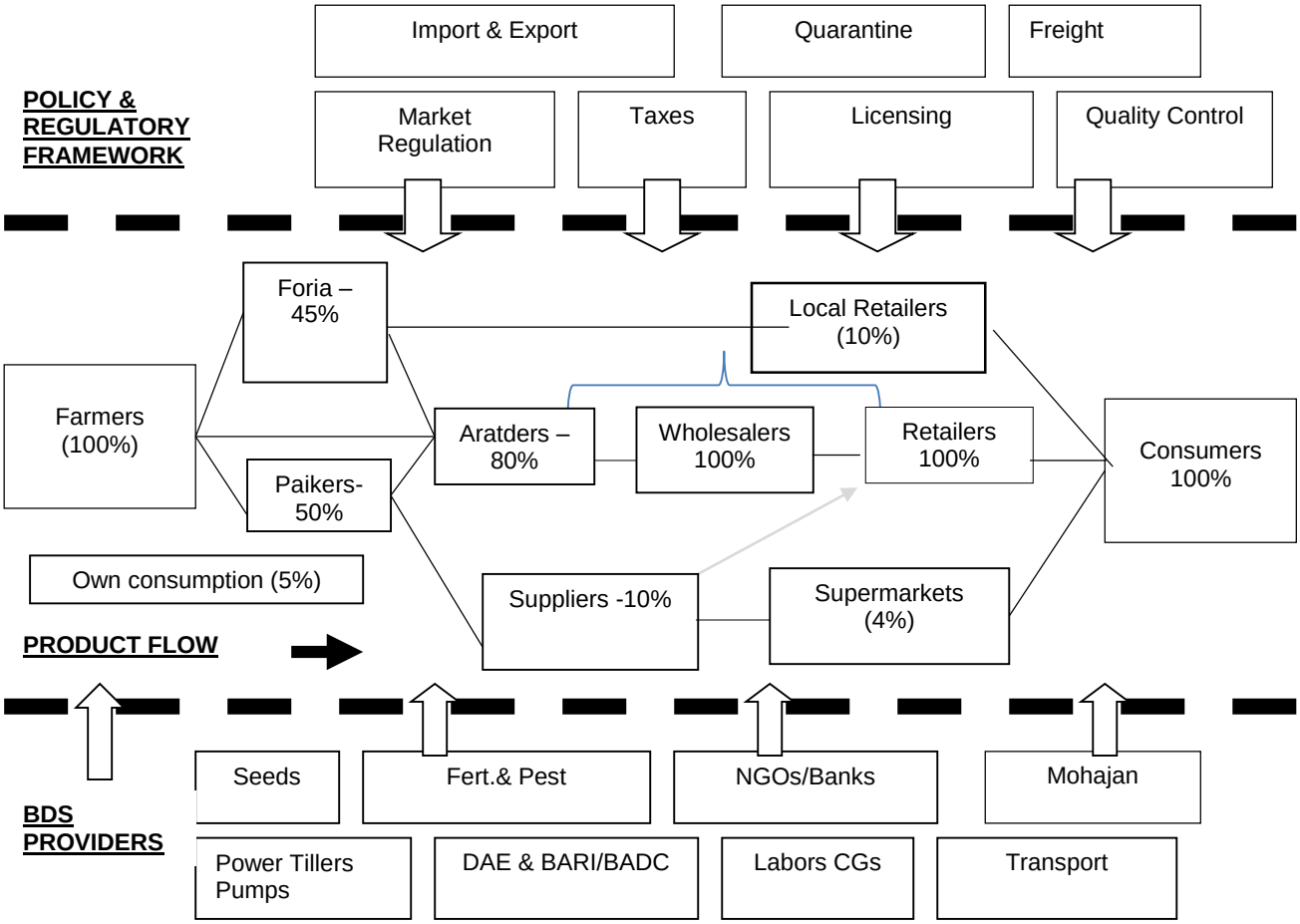
Table 42: Value proposition of brinjal VC

Value chain Actor	Purchase	Sales	Price difference	Value Addition	% of value addition	Profit	% of Profit
Farmers cost	8.4	18	9.6	8.4	54%	9.6	54%
Faria	18	20	2	1	6%	1	6%
Paiker	20	22	2	0.7	4%	1.3	7%
Local Aratder	22	23	1	0.5	3%	0.5	3%
Wholesaler	23	24	1	0.5	3%	0.5	3%
Dhaka Aratder/WS	24	26	2	1	6%	1	6%
Retailer	26	33	7	3	19%	4	22%
Consumer	33						

Table 43: Brinjal cost price along with VC actors (Tk./kg)							
Traders	Farmers	Farias	Paiker	Aratder	Suppliers	Wholesalers	Retailers
Farmers	18						
Farias	18	20					
Paikers	18	20	22				
Aratdar	18	20	22	23			
Suppliers	18	20	22	23	24		
Wholesalers	18	20	22	23	24	26	
Retailers	18	20	22	23	24	26	33



Value Chain Map 2: Brinjal VC map



Value Chain Map 3: Brinjal

- **Mutual Contact, Contract, Relation, Trust along with brinjal VC**

Contacts:

Brinjal producers have the highest and 100% contact with fertilizer, pesticides, and seed retailers. Farmer to farmer good contact 97%, above 70% contact with the faria, paiker, retailer and with suppliers, minimum contact super stores. with retailers. Least contact found with super market 10%. They have good contact with pump power tiller above then 70%. Farmers have good contact with DAE 94%, less in research organization like BARI, BADC below than 50%. Farmer have good contact with NGOs (80%) and labour contacting groups 90%. Contact with transport also high as above 83%. 57% percent farmers had contact with Banks very few with Mahajan.

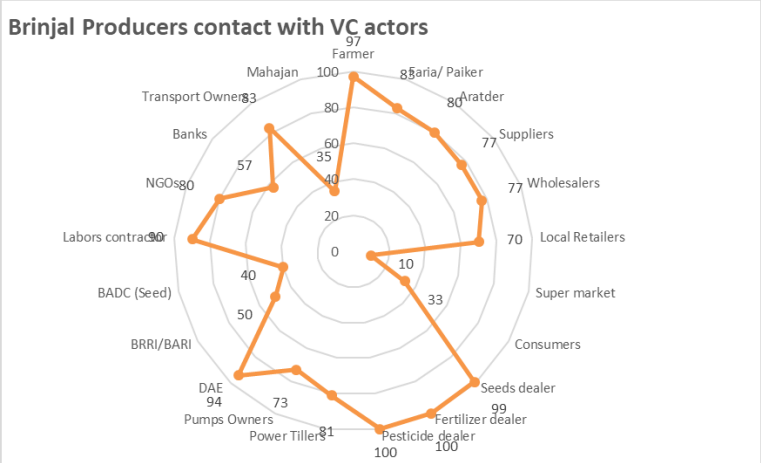


Figure 28: Brinjal produces contact with VC actors

Contract

The FGD meetings also revealed the frequency of the producers' contract with the value chain actors expressed verbally, none of the farmers have any formal or written contract with any of the VC actors or even stakeholders. There was no written or MOU and therefore no proof. Farmers/ producers went into contract with 21 different VC actors informally and oral.

About 65% brinjal producers stated have verbal contract with Faria, Paiker and aratder, below 40% with suppliers and wholesalers. With all inputs retailers, banks, and labour contractors have some extent of informal contract below than 50% of the respondents. All research organization, super market has small information about it. But 85% farmers stated that they have contact with DAE and transport providers. Farmer to farmer relationship seems highest about to 80%.

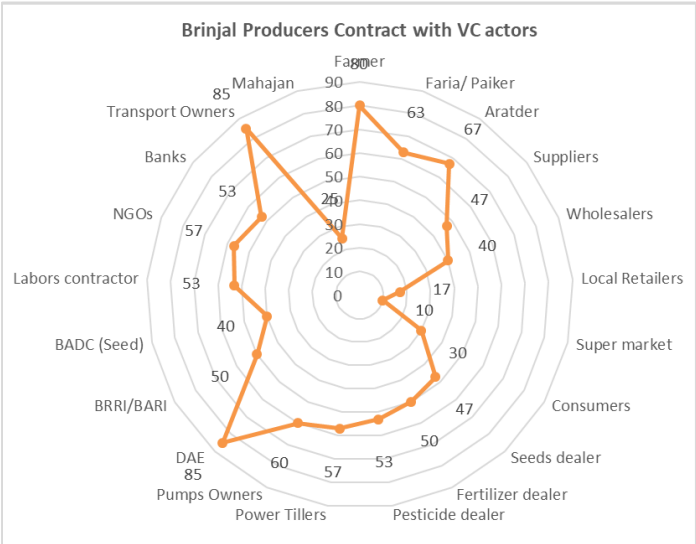


Figure 29: Brinjal produces contract with VC actors

Relationship

The depth of relationship of the brinjal producer was expressed in percentage from FGDs. These are verbal expressions of the farmers between them or with the 20 different VC actors. The seed, fertilizer and pesticide dealers had come in close contact with 100 percent. Other relations with DAE and neighbor farmers over than 90%. Relationship with faria, pikers and aratder calculated over 80%, other

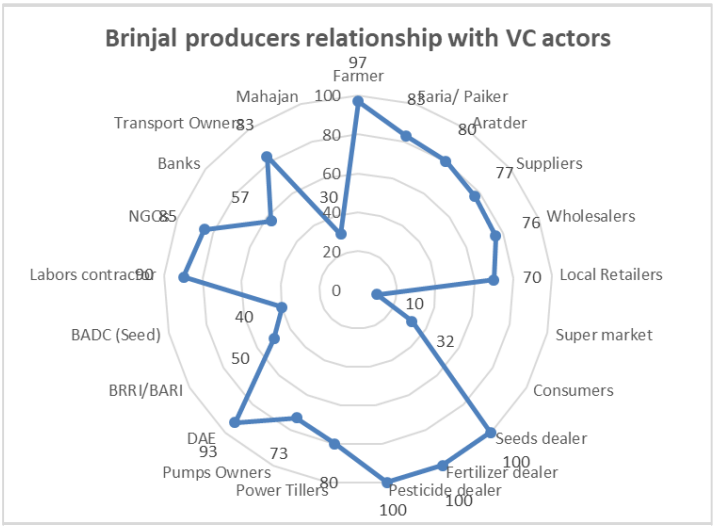


Figure 30: Brinjal produces relationship with VC actors

market actor like supplier, wholesaler 75%, Labour contracting groups 90%, BADC 40%, transport owners 83%, NGOs and suppliers 83%, and Faria/Paiker aratder above 80%, very less with super markets 10%, and local retailers 70%. Minimum relationship with superstores and consumers.

Trust on VC actors

The FGD meetings also led to discussions on the level of trust of farmers on the VC actors. The data expressed as percentage shows the feeling of trust. The trust level on an average ranged high from 20% to 100% among farmers attending the FGD meetings. One hundred percent farmers trusted fertilizer dealers, seed retailers, and pesticide dealers and shops. A high level of trust on 70% to 84% on faria, Paiker, aratder, suppliers and less on supermarket (10%). On extension service DAE existed high level of trust above 93%. BADC, and research organization below average level of trust, no trust on Mahajan. All farming groups seem to have low level of trust (33%) on the consumers.

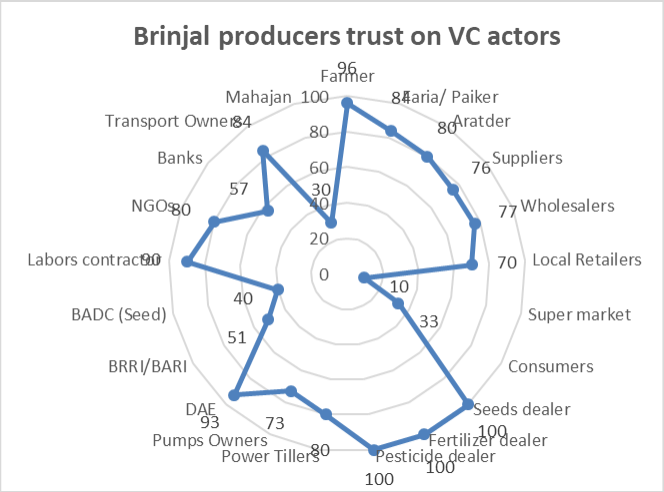


Figure 31: Brinjal produces trust with VC actors

Table 44: Brinjal producers contact, contract, relationship and trust with VC actors

No	VC actors	Contact	Contract	Relationship	Trust
1	Farmer	97	80	97	96
2	Faria/ Paiker	83	63	83	84
3	Aratder	80	67	80	80
4	Suppliers	77	47	77	76
5	Wholesalers	77	40	76	77
6	Local Retailers	70	17	70	70
7	Super market	10	10	10	10
8	Consumers	33	30	32	33
9	Seeds dealer	99	47	100	100
10	Fertilizer dealer	100	50	100	100
11	Pesticide dealer	100	53	101	100
12	Power Tillers	81	57	80	80
13	Pumps Owners	73	60	73	73
14	DAE	94	85	93	93
15	BRRI/BARI	50	50	50	51
16	BADC (Seed)	40	40	40	40
17	Labors contractor	90	53	90	90
18	NGOs	80	57	85	80
19	Banks	57	53	57	57
20	Transport Owners	83	85	83	84
21	Mahajan	35	25	30	30

- **Main constraints and probable commercially viable solution (brinjal)**

Table 45: Constraints and solution of Brinjal VC		
Sl.#	**Constraints**	**Probable solution**
A.	**Technical (pre-production harvesting, post-harvest, and product development)**	
1	Absence of business oriented crop planning (business plan) for commercial vegetable production	Training and capacity building of the CIG/CCMC members on business planning as per market demand and contractors requirements
2	Poor quality inputs (seed, fertilizer and pesticides)	Facilitate and linkage to get good quality commercial varieties of seed, good quality fertilizer, pesticides (linkage between CCMC and input supplying companies)
3	Pest infestation in high quality vegetable production	Training on disease and pest management of CIG members and CCMCs (linkage between CCMC and input supplying companies) Introduce IPM Demonstration with CCMC
4	Inadequate knowledge and poor practices on post-harvest management	Training and capacity building on post-harvest management of the CIG members/CCMCs
5	High wastages, rotten of vegetable rapidly, causes wastage then other vegetables	Training and capacity building on post-harvest management of the CIG members/CCMCs
6	No cool chain mainlining from harvest to consumer market	Facilitate to raise awareness and capacity building on cool chain management Support CCMCs/CIG or enterprises with refrigerated / refer van for transportation and sales
B	**Market Access**	
1	No direct market linkage to get profitable price	Facilitate linkage among the large scale traders, processors and supermarkets with CIG members and CCMCs
2	Lack of fair price	Facilitate to get appropriate market information through ICT and other buyers
3	No contract farming	Facilitate to start formal contract farming with processors, large scale buyers and exporter
C	**Organization and management**	
1	Inadequate market monitoring	Strengthen market monitoring system by DAM and Hortex together
2	Weak CIG and CCMC coordination with market committees	Facilitate to strengthen relationship trust, and connect with VC actors and market committees
3	No formal contract among the VC actors	Facilitate CCMC and CIG to form contract farming production system with Large scale VC actors with good relationship, contact, and trust
D	**Finance**	
1	Inadequate access to finance for traders and Post-harvest management	Facilitate and advocacy on access to loan for traders with financial institutes
2	Absence of institutional financing in perishable product business for the VC actors	Advocacy and linkage with the relevant financing institutes
E	**Infrastructure**	
1	Transportation cost is high	Facilitate to use cool van, and group transportation system by the CCMCs/CIGs
2	No Cold Storage facilities	Facilitate to establish multipurpose cold storages through private sector enterprises
4	Insufficient space and equipment's for washing, sorting, grading etc.	Facilitate to advocacy with the market committees to allocate more space in the market and widening CCMCs place together
F	**Regulatory**	
1	No quality control and Quality assurance policy	Establish QA/QC cell in the DAE along with Hortex
2	No quality certification agency	GAP and other quality compliances certification system to be established

3.7.3.3 Sweet Gourd:

- **Introduction**

As per BBS (productivity survey of pumpkin crop-2014) per acre production cost of pumpkin on an average in Bangladesh which is Taka 24663 for the year 2014. The highest per acre production of ingredient Taka 5308 in fertilizer, followed by seed & seedling related (Taka 4217), land preparation (Taka 3273), harvesting (Taka 3058) and others etc. The total production of pumpkin per acres is 5470 kg and value of the production is Tk. 57968/- at 10.6 taka per kg and cost benefit ratio 2.35. Different modern farming methods have helped increase the production and farming of sweet pumpkin in the country, a healthy and nutritious vegetable. Pumpkin cultivation takes a short time. It takes nearly four months after plantation, starts in the first week of January and harvest begins in the middle of March to early April. Below table shows the production cycle of Pumpkin

Table 46:**Pumpkin production cycle**

Months	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPP	OCT	NOV	DEC	
	Pous	Magh	Falgoon	Chaitra	Baishakh	Jaistha	Ashar	Srabon	Vadra	Aswin	Kartik	Agrahyan		
Winter														
Main crop														
Summer														
Main crop														

The project has been promoting development of value chain of sweet gourd (pumpkin) cultivation in 5 Upazilas namely in Bogra sadar, Boraigram, Delduar, Kishoreganj sadar, and savar upazila where generally land is high and soils are calcareous and sandy loam suitable for cultivation of sweet gourd. In-fact those Upazial are famous for commercial pumpkin cultivation. Among all the upazila Bogra Sadar alone produce 25650 MT pumpkin, followed by Boraigram 1550 MT, Delduar 1250MT, Kishoreganj Sadar 1150MT and Savar 125 MT as records from upzazila level DAE officials. All the upazila Hortex will work with 20 CIGs except 4 in Savar through CCMC establishment.

Table 47: Pumpkin status in Hortex selected areas

	Sweet Gourd	Bogra Sadar	**Boraigram**	**Delduar**	**Kishoreganj Sadar**	**Savar**
1	Total farmer in Upazila:	20250	23450	40900	63250	10500
2	CIG under Hortex Foundation	20	20	20	20	4
	Total CIG	400	400	400	400	80
3	Sweet Gourd Farmer	650	600	200	370	1050
4	Cultivated land (ha)	11400	10950	14500	13790	4000
5	Total area of Sweet Gourd Cultivation (ha)	1200	86	86	75	5
6	Total vegetable production (MT)	77500	37350	36580	35670	11650
7	Total Sweet Gourd production (MT)	25650	1550	1250	1150	125

- **Markets and Marketing System**

The research found that pumpkin production is a profitable enterprise. Human labor, seed cost, MoP and pesticides cost are statistically significant effects on pumpkin production. Costs of human labor and chemical fertilizers were occupied the major share of total cost of pumpkin production. According to BCR calculation, the benefit of pumpkin production at the sample area was three times more compare to the total cost. Though it is a profitable business, it could have more extended the business if the farmers are having close contact with the agricultural extension services, getting good marketing and transport facilities.

As per discussion with producers, traders, CIG members, CCMC representative and other VC actors UAO and SAAO in the selected sweet gourd clusters and it was found that in every upazila farmers are producing pumpkin except less in savar. It has established market and market chain. Traders are doing multiple vegetables business, pumpkin is one of them. Sometime producer's sold pumpkin from field and sale nearby market, or to the local traders called faria/ Paiker. Local faria and Paiker sold to the nearby market to the regional large trader via Aratder. Aratder take some sales commission or some do trade themselves. Regional trader they used to come from Dhaka or local trader also do the regional trade. These regional traders brought to Dhaka market (or regional large market) sale to another trader via another aratder. These traders do the wholesaling or some of large buyer again sale to the retailer. Retailer sale direct to consumer. Supplier purchased from Aratder/wholesaler and supply to the super markets or to the restaurants. In every steps of the value chain there are transaction cost, grading sorting, transportation, profit/loss, other overhead e.g. labour, rent, commission etc. Those are selling to super shop usually they do the little more post-harvest work like cleaning, grading and sometimes packaging. Hence CCMC can take the market opportunity direct to supply super shops or large level wholesale buyer or to the super markets.

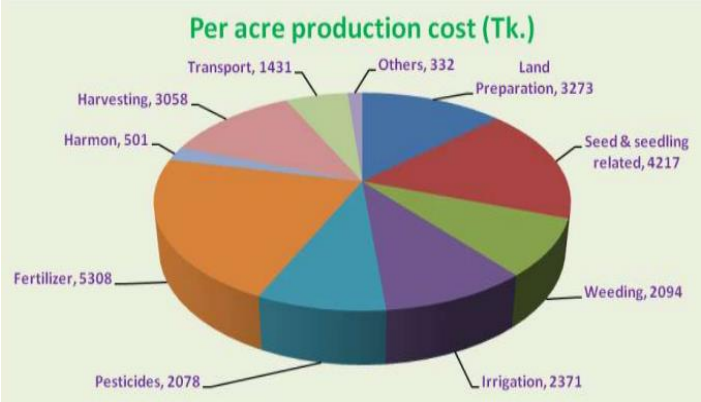


Figure 33Production cost of Pumpkin

From the market scenario if climatic condition and market dynamics is normal, then farmers are getting more profit (40%) also adding value more 47%. The value progression along with pumpkin value chain as shown in below table 48.

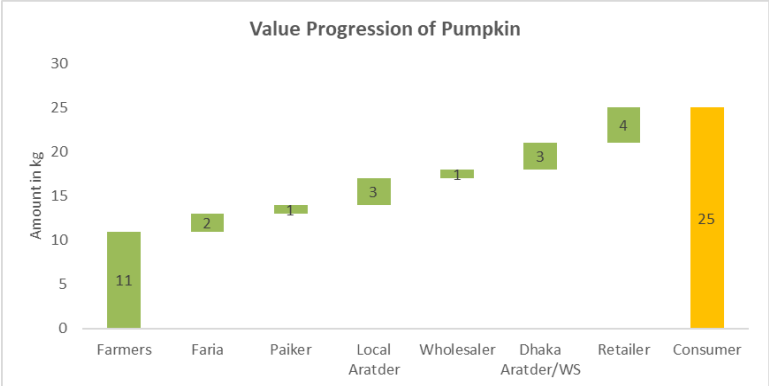


Figure 32: Value progression of Pumpkin VC

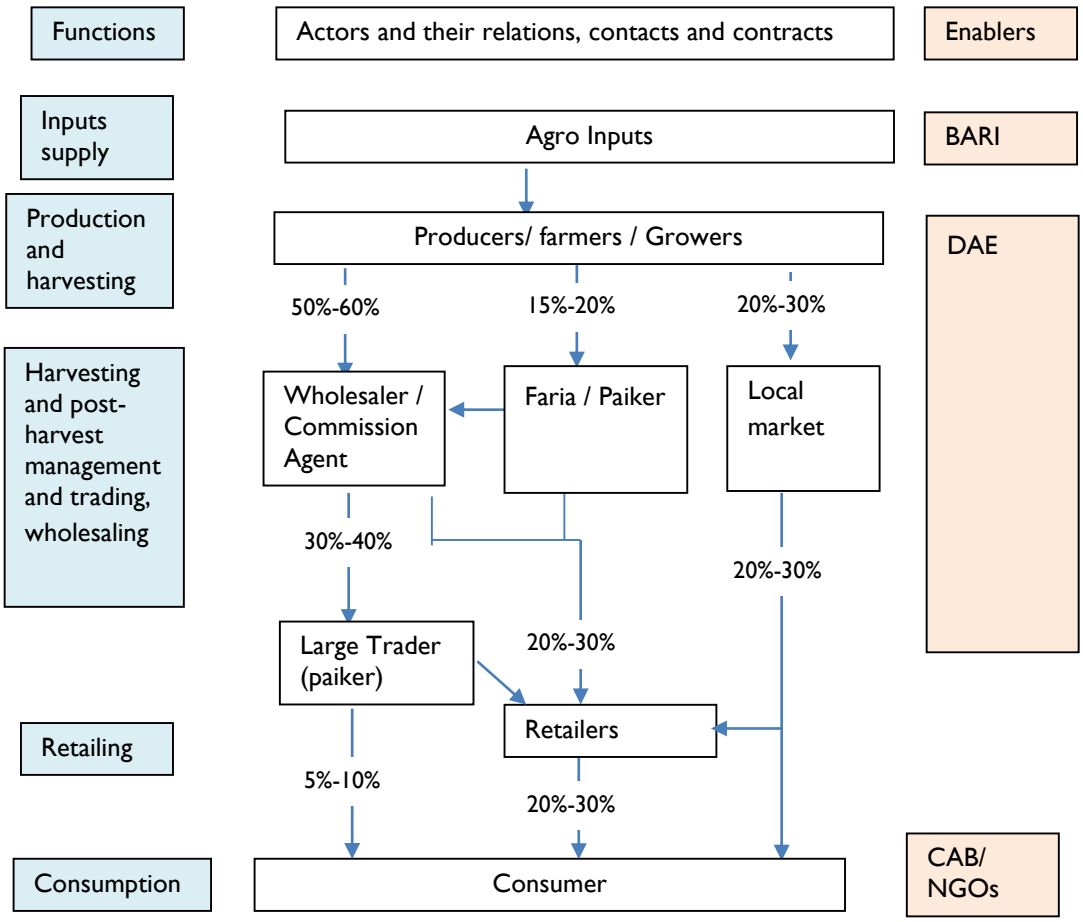
Table 48: Value progression of Pumpkin

Value chain Actor	Purchase	Sales	Price difference	Value Addition	% of value addition	Profit	% of Profit
Farmers cost	6.3	11	4.7	6.3	47%	4.7	40%
Faria	11	13	2	1	8%	1	9%
Paiker	13	14	1	0.5	4%	0.5	4%
Local Aratder	14	17	3	1	8%	2	17%
Wholesaler	17	18	1	0.5	4%	0.5	4%
Dhaka Aratder/WS	18	21	3	1	8%	2	17%
Retailer	21	25	4	3	23%	1	9%
Consumer	25						

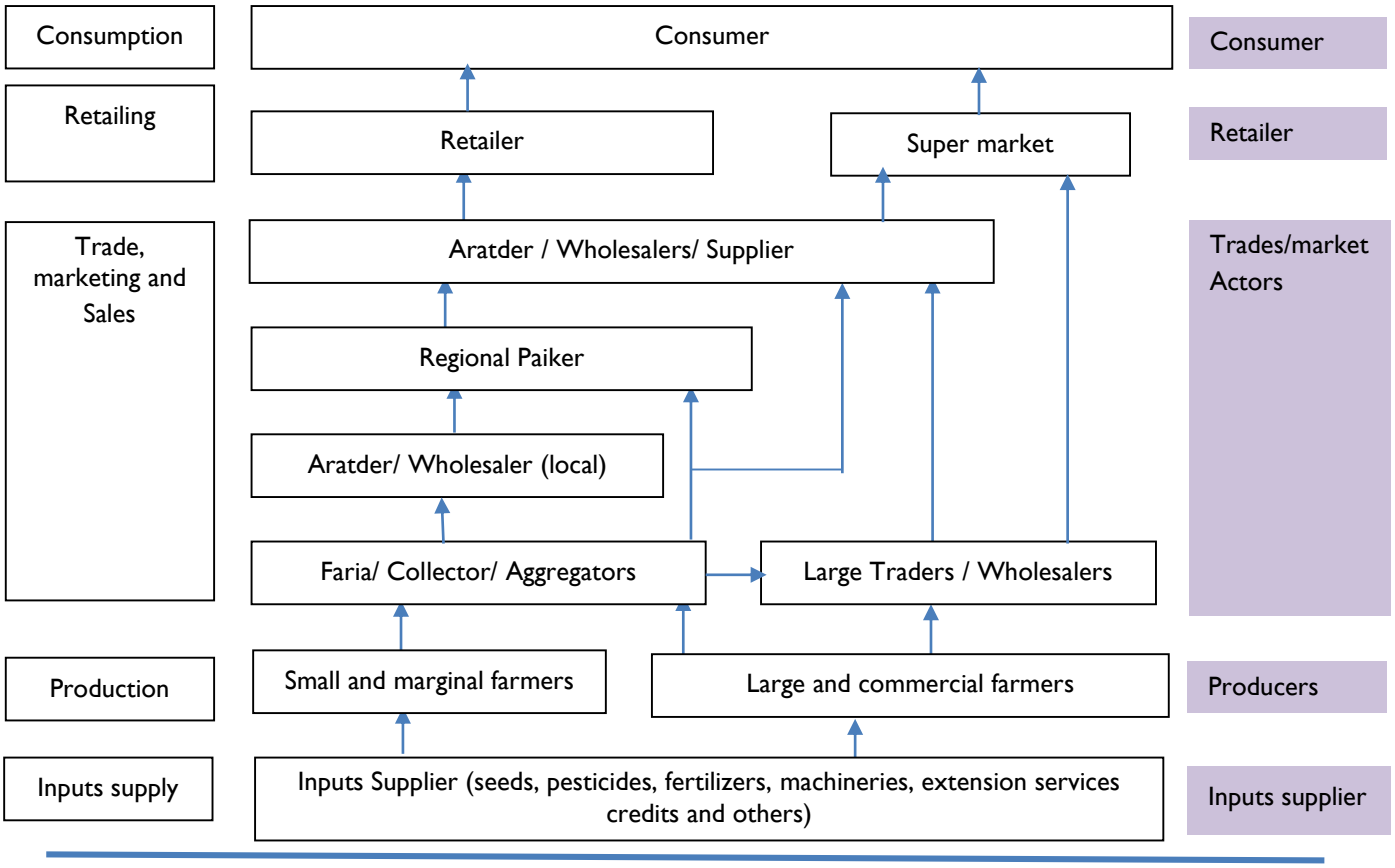
Table 49: **Price of buying the product Tk./Kg (Sweet Gourd)**							
Traders	**Farmers**	**Farias**	**Paiker**	**Aratder**	**Suppliers**	**Wholesalers**	**Retailers**
Farmers	11						
Farias	11	13					
Paikers	11	13	16				
Aratdar	11	13	16	18			
Suppliers	11	13	16	18	18		
Wholesalers	11	13	16	18	18	21	
Retailers	11	13	16	18	18	21	25

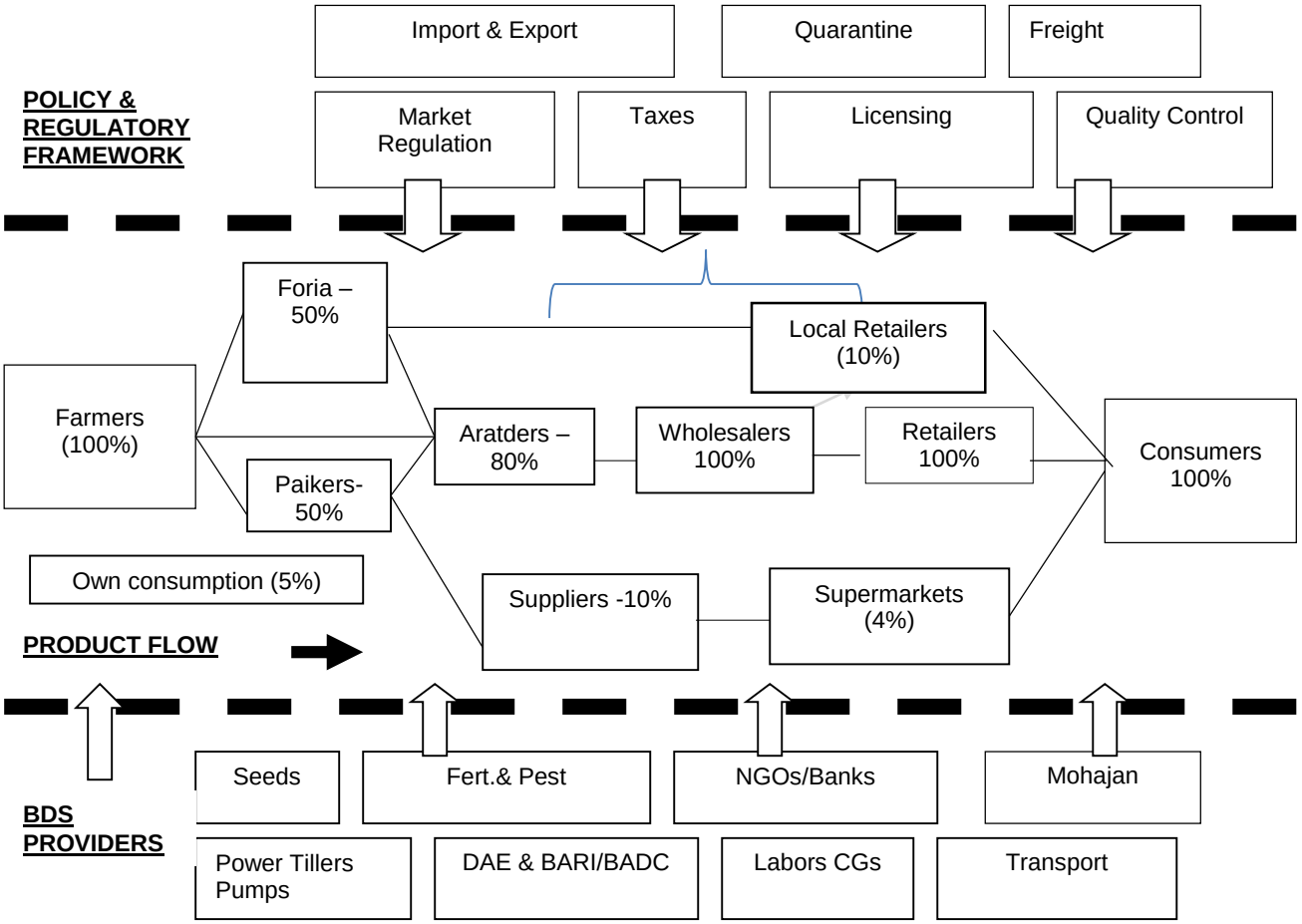
- **Value Chain and Marketing System**

In Bangladesh there are five tiers marketing system which is prevailing in pumpkin business. The five tiers are identified as - Farmers, Faria, Big Traders (Bepari/Paiker), Wholesaler, Commission agents/Aratder, retailers and consumers



Value Chain Map 4: Value Chain of Pumpkin





Value Chain Map 5: Value Chain of Pumpkin

- **Mutual Contact, Contract, Relation, Trust along with Pumpkin VC**

Contacts:

Pumpkin producers have the highest and 100% contact with fertilizer, pesticides, and seed retailers. Farmer to farmer good contact 97%, above 70% contact with the faria, paiker, retailer and with suppliers, minimum contact super stores. with retailers. Least contact found with super market 10%. They have good contact with pump power tiller above then 70%. Farmers have good contact with DAE 94%, less in research organization like BARI, BADC below than 50%. Farmer have good contact with NGOs (80%) and labour contacting groups 90%. Contact with transport also high as above 83%. 57% percent farmers had contact with Banks very few with Mahajan.

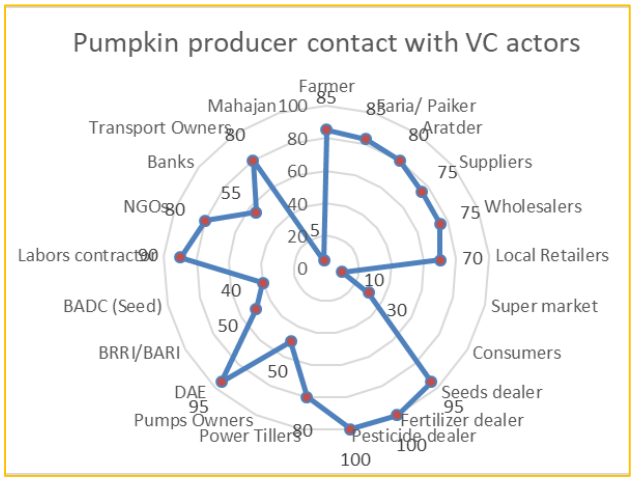


Figure 34: Pumpkin producers contact with VC actors

Contract

The FGD meetings also revealed the frequency of the producers' contract with the value chain actors expressed verbally, none of the farmers have any formal or written contract with any of the VC actors or even stakeholders. There was no written or MOU and therefore no proof. Farmers/ producers went into contract with 21 different VC actors informally and oral.

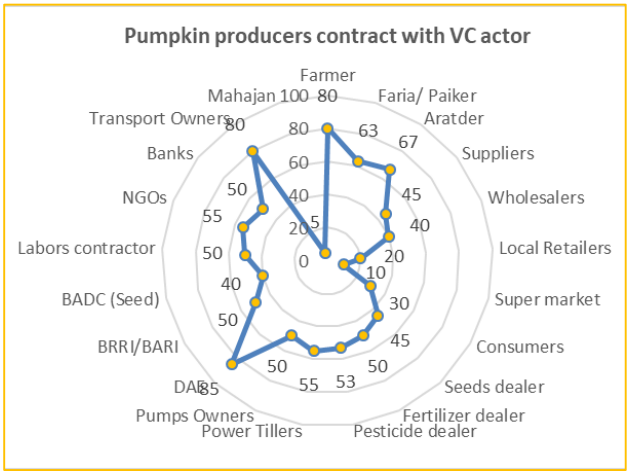


Figure 35: Pumpkin producers contract with VC actors

About 65% pumpkin producers stated have verbal contract with Faria, Paiker and aratder, below 40% with suppliers and wholesalers. With all inputs retailers, banks, and labour contractors have some extent of informal contract below than 50% of the respondents. All research organization, super market has small information about it. But 85% farmers stated that they have contact with DAE and transport providers. Farmer to farmer relationship seems highest about to 80%.

Relationship

The depth of relationship of the pumpkin producer was expressed in percentage from FGDs. These are verbal expressions of the farmers between them or with the 20 different VC actors. The seed, fertilizer and pesticide dealers had come in close contact with 100 percent. Other relations with DAE and neighbor farmers over than 90%. Relationship with faria, pikers and aratder calculated over 80%, other market actor like supplier, wholesaler 75%, Labour contracting groups 90%, BADC 40%, transport owners 83%, NGOs and suppliers 83%, and Faria/Paiker aratder above 80%, very less with super markets 10%, and local retailers 70%. Minimum relationship with superstores and consumers.

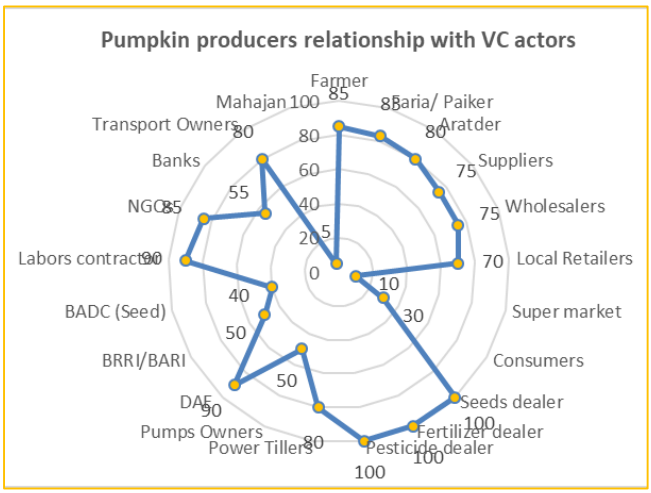


Figure 36: Pumpkin producers relationship with VC actors

Trust on VC actors

The FGD meetings also led to discussions on the level of trust of farmers on the VC actors. The data expressed as percentage shows the feeling of trust. The trust level on an average ranged high from 20% to 100% among farmers attending the FGD meetings. One hundred percent farmers trusted fertilizer dealers, seed retailers, and pesticide dealers and shops. A high level of trust on 70% to 84% on faria, Paiker, aratder, suppliers and less on supermarket (10%). On extension service DAE existed high level of trust above 93%. BADC, and research organization below average level of trust, no trust on Mahajan. All farming groups seem to have low level of trust (33%) on the consumers.

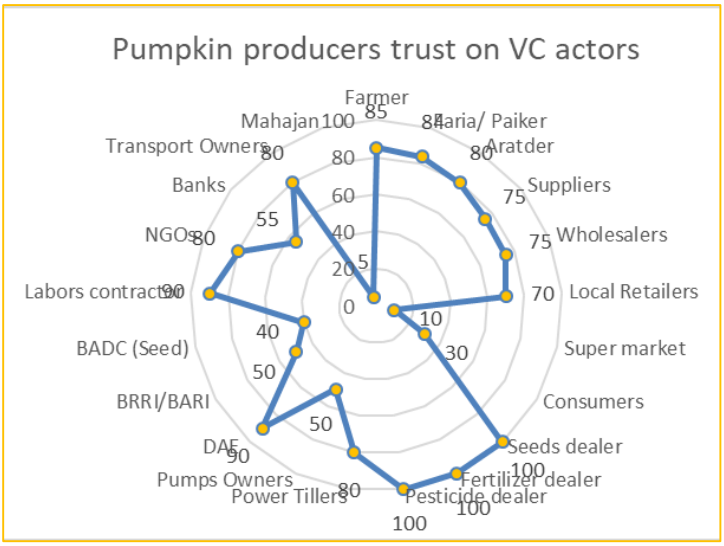


Figure 37: Pumpkin producers trust with VC actors

Table 50: Pumpkin producers trust on VC actors					
No	**Value Chain Actors**	**Contact**	**Contract**	**Relationship**	**Trust**
1	Farmer	85	80	85	85
2	Faria/ Paiker	83	63	83	84
3	Aratder	80	67	80	80
4	Suppliers	75	45	75	75
5	Wholesalers	75	40	75	75
6	Local Retailers	70	20	70	70
7	Super market	10	10	10	10
8	Consumers	30	30	30	30
9	Seeds dealer	95	45	100	100
10	Fertilizer dealer	100	50	100	100
11	Pesticide dealer	100	53	100	100
12	Power Tillers	80	55	80	80
13	Pumps Owners	50	50	50	50
14	DAE	95	85	90	90
15	BRRI/BARI	50	50	50	50
16	BADC (Seed)	40	40	40	40
17	Labors contractor	90	50	90	90
18	NGOs	80	55	85	80
19	Banks	55	50	55	55
20	Transport Owners	80	80	80	80
21	Mahajan	5	5	5	5

- **Main constraints and probable commercially viable solution (pumpkin)**

Table 51: Constraints and solution over pumpkin VC		
Sl.#	**Constraints**	**Probable solution**
A.	**Technical (pre-production harvesting, post-harvest, and product development)**	
1	Absence of business oriented crop planning (business plan) for commercial vegetable production	Training and capacity building of the CIG/CCMC members on business planning as per market demand and contractors requirements
2	Poor quality inputs (seed, fertilizer and pesticides)	Facilitate and linkage to get good quality commercial varieties of seed, good quality fertilizer, pesticides (linkage between CCMC and input supplying companies)

3	Pest infestation in high quality vegetable production	Training on disease and pest management of CIG members and CCMCs (linkage between CCMC and input supplying companies) Introduce IPM Demonstration with CCMC
4	Inadequate knowledge and poor practices on post-harvest management	Training and capacity building on post-harvest management of the CIG members/CCMCs
5	High wastages, rotten of vegetable rapidly, causes wastage then other vegetables	Training and capacity building on post-harvest management of the CIG members/CCMCs
6	No cool chain mainlining from harvest to consumer market	Facilitate to raise awareness and capacity building on cool chain management Support CCMCs/CIG or enterprises with refrigerated / refer van for transportation and sales
B	**Market Access**	
1	No direct market linkage to get profitable price	Facilitate linkage among the large scale traders, processors and supermarkets with CIG members and CCMCs
2	Lack of fair price	Facilitate to get appropriate market information through ICT and other buyers
3	No contract farming in summer tomato and for winter tomato	Facilitate to start formal contract farming with processors, large scale buyers and exporter
C	**Organization and management**	
1	Inadequate market monitoring	Strengthen market monitoring system by DAM and Hortex together
2	Weak CIG and CCMC coordination with market committees	Facilitate to strengthen relationship trust, and connect with VC actors and market committees
3	No formal contract among the VC actors	Facilitate CCMC and CIG to form contract farming production system with Large scale VC actors with good relationship, contact, and trust
D	**Finance**	
1	Inadequate access to finance for traders and Post-harvest management	Facilitate and advocacy on access to loan for traders with financial institutes
2	Absence of institutional financing in perishable product business for the VC actors	Advocacy and linkage with the relevant financing institutes
E	**Infrastructure**	
1	Transportation cost is high	Facilitate to use cool van, and group transportation system by the CCMCs/CIGs
2	No Cold Storage facilities	Facilitate to establish multipurpose cold storages through private sector enterprises
4	Insufficient space and equipment's for washing, sorting, grading etc.	Facilitate to advocacy with the market committees to allocate more space in the market and widening CCMCs place together
F	**Regulatory**	
1	No quality control and Quality assurance policy	Establish QA/QC cell in the DAE along with Hortex
2	No quality certification agency	GAP and other quality compliances certification system to be established

3.7.3.4 Bitter Gourd:

- **Introduction:**

Bitter gourd (*Momordica charantia* L.) is one of the important cucurbitaceous vegetable crops grown in Bangladesh. It is a high value nutritious vegetable crop grown in the summer season when the availability of other vegetables is scanty due to adverse climatic conditions. Previously it was considered as homestead vegetable but now it is grown as field crop. The cucurbit fruit fly is a highly damaging pest of almost all the cucurbit vegetables. It is grown extensively throughout the country during Kharif season which was cultivated in 23,890 acres and total production of 52,020 metric tons (BBS, 2013) per annum.

The crop is rich in carotene, calcium and iron; can be grown in any type of soil but loamy to sandy loamy soils are preferred for better growth and quality fruit. Seeds are directly sown in the field. Sometimes seedlings are raised and 15-20 days old seedlings are transplanted in the main field during March to May. Ucchya, the smaller ones, has no specific local variety but the larger one, Karala, has a local variety known as Gaj Karalla. The yield of Ucchya is about 5 m tons/ha and Karala 15-18 m tons/ha. Bitter gourd is consumed by making curry or frying.

- **Production Cycle**

In summer production process starts in Mid-January when seeds are sown in seed bed and continue till in March. Planting begin in mid-April and the summer crop cycle continues till mid-December

Table 52: Production cycle of Bitter Gourd VC

Months	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPP	OCT	NOV	DEC	
	Pous	Magh	Falgoon	Chaitra	Baishakh	Jaistha	Ashar	Srabon	Vadra	Aswin	Kartik	Agrahyan		
Main crop														

- **Selected cluster (area) of bitter gourd value chain**

The NATP-2 (Hortex) project has been promoting development of value chain of bitter gourd in 5 Upazilas namely in Kaliganj, Madhupur, Belabo, naogaon, and Mithapukur where generally land is high and soils are suitable for cultivation of bitter gourd. In fact, those Upazilla are famous for commercial bitter gourd cultivation. Among all the Modhupur produce higher 2050 MT, Belabo 1250 MMT, Mithapukur 800MT and Kaliganj 550MT per year as records from upzazila level DAE officials. All the upazla Hortex will work with 20 CIGs except 30 in Belabo through CCMC establishment.

Table 53: Bitter gourd status in Hortex selected areas

	Bitter Gourd	Kaliganj	Modhupur	Belabo	Naogaon	Mithapukur
1	Total farmer in Upazila:	65450	55480	42930	48464	15575
2	CIG under Hortex Foundation	20	20	30	20	20
	Total CIG	400	400	600	400	600

Table 53: Bitter gourd status in Hortex selected areas						
	Bitter Gourd	**Kaliganj**	**Modhupur**	**Belabo**	**Naogaon**	**Mithapukur**
3	Bitter Gourd Farmer	675	855	625	900	270
4	Cultivated land (ha)	22298	25690	9279	1125	18170
5	Total area of Bitter Gourd Cultivation (ha)	30	115	100	150	50
6	Total vegetable production (MT)	80950	75500	137500	42000	22670
7	Total Bitter Gourd production (MT)	550	2050	1250	900	800

- **Value Chains of the Bitter gourd:**

As per discussion with producers, traders, CIG members, CCMC representative, other VC actors UAO and SAAO in the selected bitter gourd clusters it was found that in every upazila there are plenty of bitter gourd are producing. It has established market and market chain. Traders are doing multiple product business along with other vegetable. Usually producers harvest / pick bitter gourd twice in a week and sale nearby market, or to the local traders called faria/ Paiker. Some time they sold from their field also. Local faria and Paiker sold to the nearby market to the regional large trader via Aratder. Aratder take some sales commission or some do trade themselves. Regional trader they used to come from Dhaka or local trader also do the regional trade. These regional traders brought to Dhaka market (or regional large market) sale to another trader via another aratder. These traders may be retail or some of large buyer again sale to the retailer. Retailer sale direct to consumer. In Dhaka in between there are supplier purchased bitter gourd from Aratder/wholesaler and supply to the super markets or to the restaurants. In every steps of the transaction there are transaction cost, grading sorting, transportation, profit/loss, other overhead e.g. labour, rent, commission etc. Those are selling to super shop usually they do the little more post-harvest work like cleaning, grading and sometimes packaging. Hence CCMC can take the market opportunity direct to supply super shops or large level wholesale buyer.

From the market scenario, if climatic condition and market dynamics is normal farmers are getting more profit (53%) than other VC actors in the value chain, producers are also adding value more 40%. Retailer earned 22% profit with adding value 19%, faria and paiker get same profit 6% and added value 13% each. Dhaka level aratder and wholesaler also earn 6% profit with adding 3% value. The value progression along with bitter gourd value chain as shown in below table.

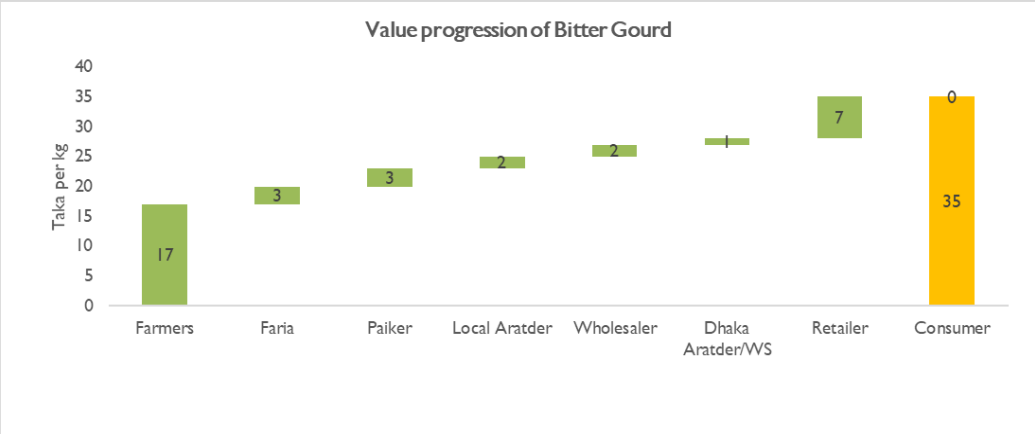
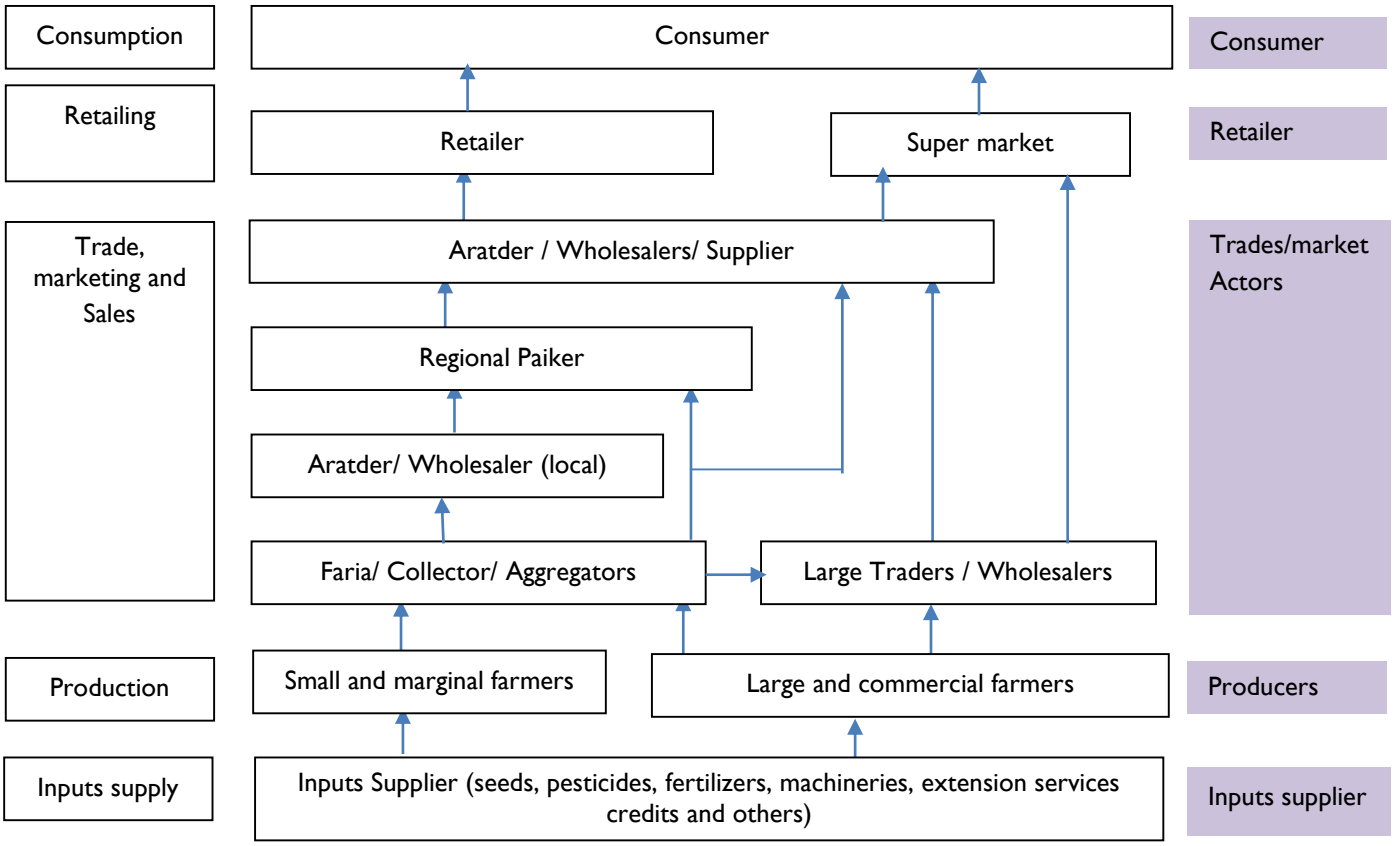


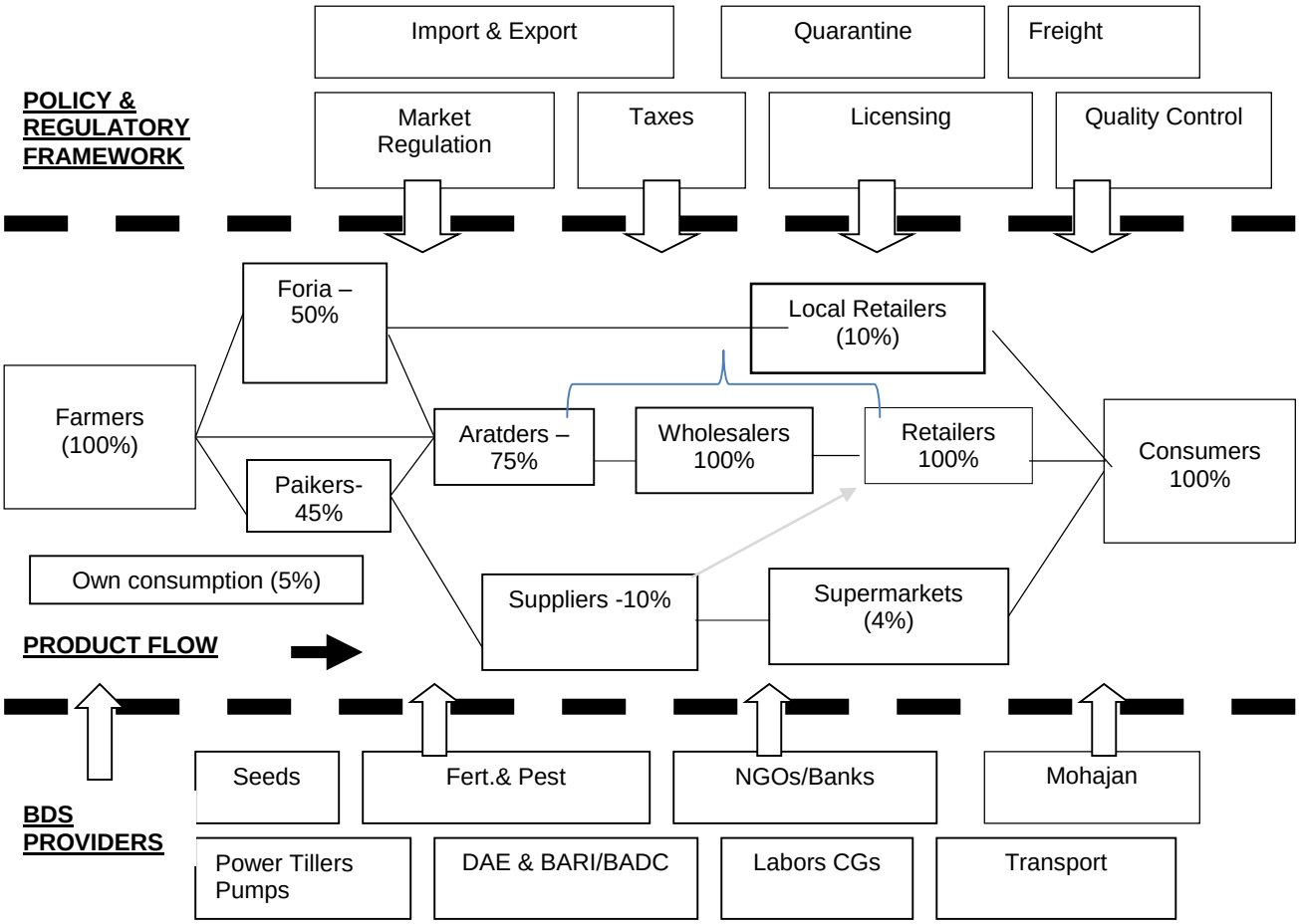
Figure 38: Value progression of Bitter gourd VC

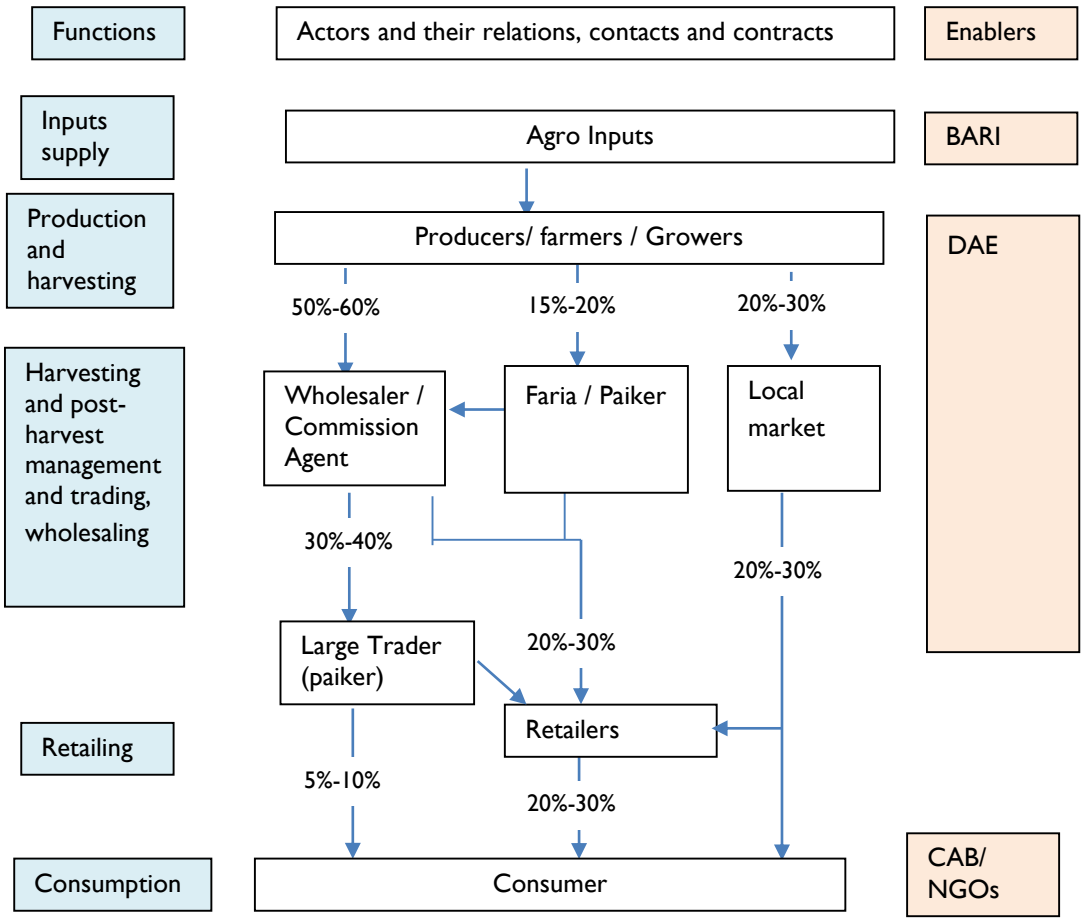
Table 54:**Value progression of Bitter Gourd VC**							
Value chain Actor	**Purchase**	**Sales**	**Price difference**	**Value Addition**	**% of value addition**	**Profit**	**% of Profit**
Farmers cost	7.5	17	9.5	6.3	40%	9.5	53%
Faria	17	20	3	2	13%	1	6%
Paiker	20	23	3	2	13%	1	6%
Local Aratder	23	25	2	1	6%	1	6%
Wholesaler	25	27	2	1	6%	1	6%
Dhaka Aratder/WS	27	28	1	0.5	3%	0.5	3%
Retailer	28	35	7	3	19%	4	22%
Consumer	35						

Table 55: **Price of buying the product Tk./Kg (Bitter gourd)**							
Traders	Farmers	Farias	Paiker	Aratder	Suppliers	Wholesalers	Retailers
Farmers	17						
Farias	17	20					
Paikers	17	20	23				
Aratdar	17	20	23	25			
Suppliers	17	20	23	25	27		
Wholesalers	17	20	23	25	27	28	
Retailers	17	20	23	25	27	28	35



Value Chain Map 6: Bitter gourd VC





Value Chain Map 7: Bitter gourd VC map

- **Mutual Contact, Contract, Relation, Trust along with bitter gourd VC**

Contacts:

90% bitter gourd producers have contact with fertilizer, pesticides, and seed retailers. Farmer to farmer good contact 80%, above 60%-70% contact with the faria, paiker, retailer suppliers and with pumps, power tillers, minimum contact super stores. with retailers. Least contact found with super market 10%. Farmers have good contact with DAE 70%, less in research organization like BARI, BADC below than 25%. Farmer have good contact with transporters (80%) and labors 90%.

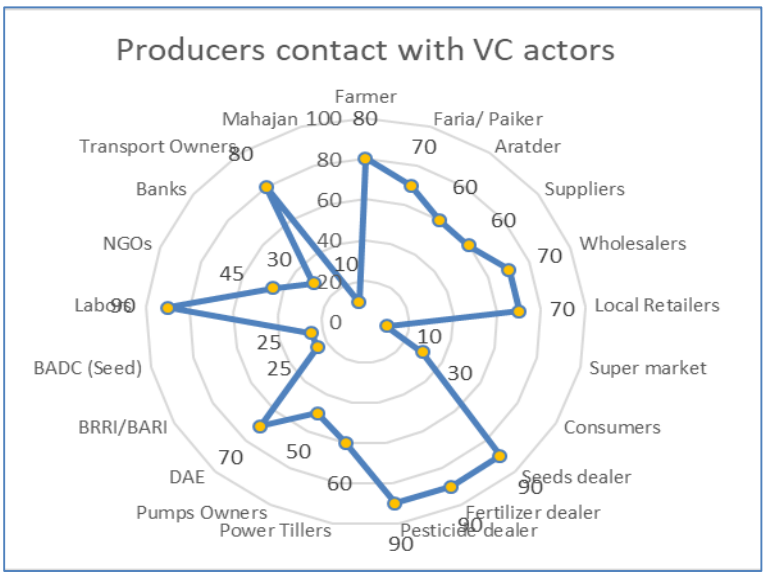


Figure 39: Bitter Gourd Producers contact with VC actors

Contract

The FGD meetings also revealed the frequency of the producers' contract with the value chain actors expressed verbally, none of the farmers have any formal or written contract with any of the VC actors or even stakeholders. There was no written or MOU and therefore no proof. Farmers/ producers went into contract with 21 different VC actors informally and oral.

About 50-65% bitter gourd producers stated have verbal contract with Faria, Paiker, supplier and aratder, less with super markets. With all inputs retailers, banks, and labour contractors have some extent of informal contract about to 80%. All research organization, super market has small information about it. But 60% farmers stated that they have contact with DAE and transport providers. Farmer to farmer relationship seems highest about to 80%.

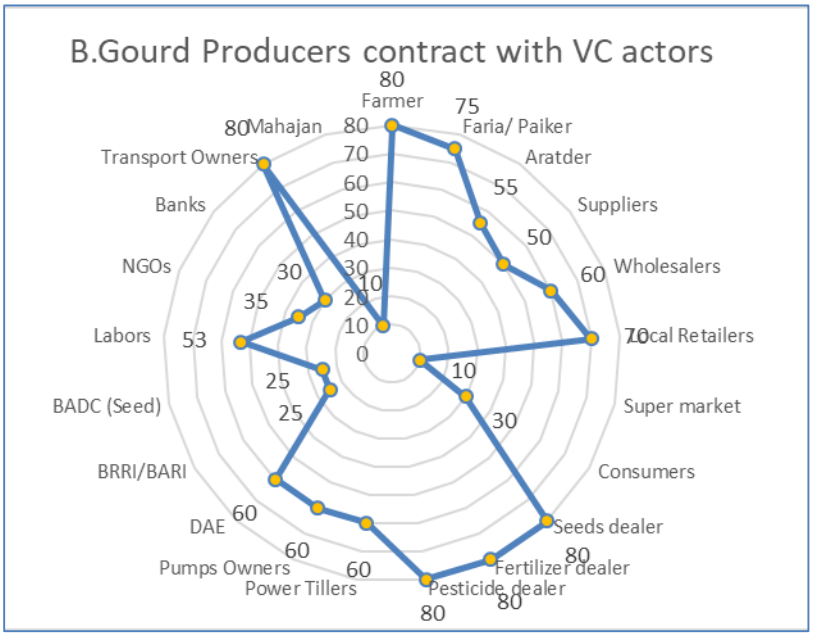


Figure 40: Bitter Gourd Producers contract with VC actors

Relationship

The depth of relationship of the bitter gourd producer was expressed in percentage from FGDs. These are verbal expressions of the farmers between them or with the 21 different VC actors. The seed, fertilizer and pesticide dealers had come in close relation with 90 percent. Other relations with DAE and neighbor farmers 70% to 80%. Relationship with faria, pikers and aratder calculated ranges from 55%-70%, Labour 90%, BADC/BARI 25%, transport owners 80%, NGOs and suppliers 30%, local retailers 70% and very less with super markets 10%.

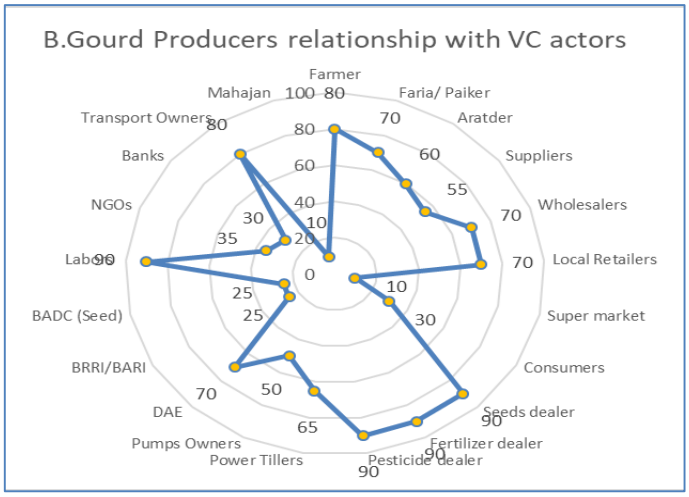


Figure 41: Bitter Gourd Producers relationship with VC actors

Trust on VC actors

The FGD meetings also led to discussions on the level of trust of farmers on the VC actors. The data expressed as percentage shows the feeling of trust. The trust level on an average ranged high from 20% to 100% among farmers attending the FGD meetings. 90% farmers trusted fertilizer dealers, seed retailers, and pesticide dealers and shops. A high level of trust on 45%-70% on faria, Paiker, aratder, suppliers, wholesaler, and retailers. Less trust on supermarket (10%). On extension service DAE existed trust about 60%. BADC, and research organization below average level of trust, no trust on Mahajan. All farming groups seem to have low level of trust (30%) on the consumers.

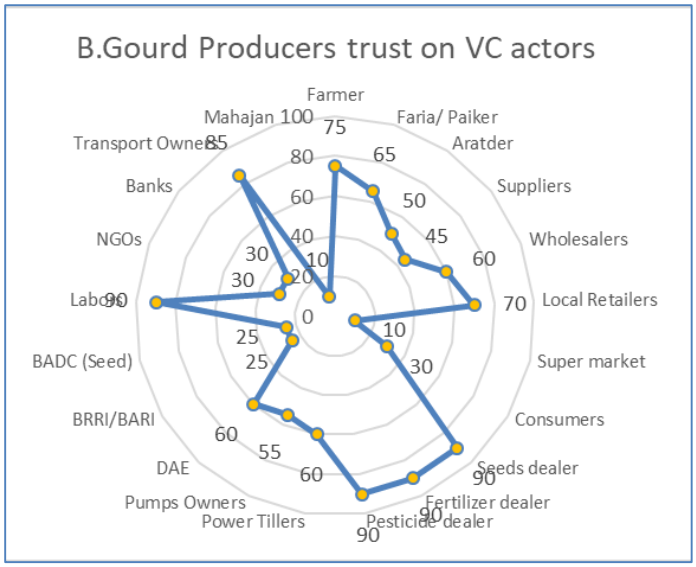


Figure 42: Bitter Gourd Producers trust with VC actors

Table 56: Bitter Gourd Producers contact, contract, relationship and trust with VC actors

No		Contact	Contract	Relationship	Trust
1	Farmer	80	80	80	75
2	Faria/ Paiker	70	75	70	65
3	Aratder	60	55	60	50
4	Suppliers	60	50	55	45
5	Wholesalers	70	60	70	60
6	Local Retailers	70	70	70	70
7	Super market	10	10	10	10
8	Consumers	30	30	30	30
9	Seeds dealer	90	80	90	90
10	Fertilizer dealer	90	80	90	90
11	Pesticide dealer	90	80	90	90
12	Power Tillers	60	60	65	60
13	Pumps Owners	50	60	50	55
14	DAE	70	60	70	60
15	BRRI/BARI	25	25	25	25
16	BADC (Seed)	25	25	25	25
17	Labors	90	53	90	90
18	NGOs	45	35	35	30
19	Banks	30	30	30	30
20	Transport Owners	80	80	80	85
21	Mahajan	10	10	10	10

- **Main constraints and probable commercially viable solution (bitter gourd)**

Table 57: Constraints and probable solution along with bitter gourd VC

Sl.#	Constraints	Probable solution
A.	**Technical (pre-production harvesting, post-harvest, and product development)**	
1	Absence of business oriented crop planning (business plan) for commercial vegetable production	Training and capacity building of the CIG/CCMC members on business planning as per market demand and contractors requirements
2	Poor quality inputs (seed, fertilizer and pesticides)	Facilitate and linkage to get good quality commercial varieties of seed, good quality fertilizer, pesticides (linkage between CCMC and input supplying companies)
3	Pest infestation in high quality vegetable production	Training on disease and pest management of CIG members and CCMCs (linkage between CCMC and input supplying companies) Introduce IPM Demonstration with CCMC
4	Inadequate knowledge and poor practices on post-harvest management	Training and capacity building on post-harvest management of the CIG members/CCMCs
5	High wastages, rotten of vegetable rapidly, causes wastage then other vegetables	Training and capacity building on post-harvest management of the CIG members/CCMCs
6	No cool chain mainlining from harvest to consumer market	Facilitate to raise awareness and capacity building on cool chain management Support CCMCs/CIG or enterprises with refrigerated / refer van for transportation and sales
B	**Market Access**	
1	No direct market linkage to get profitable price	Facilitate linkage among the large scale traders, processors and supermarkets with CIG members and CCMCs
2	Lack of fair price	Facilitate to get appropriate market information through ICT and other buyers
3	No contract farming	Facilitate to start formal contract farming with processors, large scale buyers and exporter
C	**Organization and management**	
1	Inadequate market monitoring	Strengthen market monitoring system by DAM and Hortex together
2	Weak CIG and CCMC coordination with market committees	Facilitate to strengthen relationship trust, and connect with VC actors and market committees
3	No formal contract among the VC actors	Facilitate CCMC and CIG to form contract farming production system with Large scale VC actors with good relationship, contact, and trust
D	**Finance**	
1	Inadequate access to finance for traders and Post-harvest management	Facilitate and advocacy on access to loan for traders with financial institutes
2	Absence of institutional financing in perishable product business for the VC actors	Advocacy and linkage with the relevant financing institutes
E	**Infrastructure**	
1	Transportation cost is high	Facilitate to use cool van, and group transportation system by the CCMCs/CIGs
2	No Cold Storage facilities	Facilitate to establish multipurpose cold storages through private sector enterprises
4	Insufficient space and equipment's for washing, sorting, grading etc.	Facilitate to advocacy with the market committees to allocate more space in the market and widening CCMCs place together
F	**Regulatory**	
1	No quality control and Quality assurance policy	Establish QA/QC cell in the DAE along with Hortex
2	No quality certification agency	GAP and other quality compliances certification system to be established

3.7.3.5 Banana:

- **Introduction**

Banana is a year-round crop which is valued for energy, vitamin and mineral contents. The climate and soil of Bangladesh are favorable for cultivation of year round fruits and vegetables. To meet nutritional needs and increase employment opportunities of the farmers, demand for producing year round crop is increasing. Banana cultivation, therefore, plays a vital role in providing nutrition, extra income and employment as well as in poverty alleviation. About 17% market share of the fruit sector in Bangladesh occupies by banana having positive growth. Banana has huge demand as safe food concern. I 2016-17 total banana production was 807104MT from 120203 acres of land.

Bananas represent 20% of all fruits crops produced in Bangladesh, with a domestic market share of 36%. This study analyzes banana production, marketing, distribution, and value chain functions and relationships.

Banana is considered "one of the finest fruits and the most important" in terms of food value, food security, food availability and above all, it is a crop that has a positive impact due to its profitability margins aimed at increasing household income and alleviating poverty. Most importantly, the "super fruit" crop is not only economically important, but has the best nutritional value as well - all in one". The popularity of banana is partially due to its "low price and multiple uses" i.e., as vegetable and as a dessert fruit. It is a rich source of carbohydrate and having plenty of vitamins particularly vitamin B. It is also a good source of potassium, phosphorus, calcium and magnesium. Ripe banana mixed with rice and milk is the traditional dish for the Bangladeshis. Banana powder is used as the first baby food. It helps in reducing risk of heart disease when used regularly and is recommended for patients suffering from high blood pressure, arthritis, ulcer, gastroenteritis and kidney disorders". This survey investigates the value progressions, find out constraints and opportunities, along with VC in selected areas.

Table 58:Banana production in selected clusters districts in Bangladesh

Zilla/Division	2014-15		2015-16		2016-17	
	Area (acres)	Production (M. Ton)	Area (acres)	Production (M. Ton)	Area (acres)	Production (M. Ton)
Bogra	1856	13279	1904	13613	2242	14116
Gaibandha	3583	66583	3596	65534	3565	65109
Gazipur	1009	6329	1040	6426	1042	6452
Khagrachhari	5327	17092	5409	17625	5642	18797
Mymensing	5264	21482	5348	35293	5324	37449

Respondents were asked to express about the problems they were encountering in their banana cultivation. It was found that almost all the respondents encountered almost same nature problems but in varied degrees, e.g. lack of human skilled labor was encountered as the most hindering problem for banana cultivation as it was mentioned by maximum (95%) followed by lower output price, inadequate extension services, high price of inputs – sucker, fertilizer and pesticide and diseases. So, although profitable, banana cultivation was constrained by several limitations in the study area.

- **Production Cycle**

Table 59:**Production cycle of Banana**

Months	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPP	OCT	NOV	DEC	
	Pous	Magh	Falgoon	Chaitra	Baishakh	Jaistha	Ashar	Srabon	Vadra	Aswin	Kartik	Agrahayan		
Winter														
Main crop														

- **Selected Clusters of Banana:**

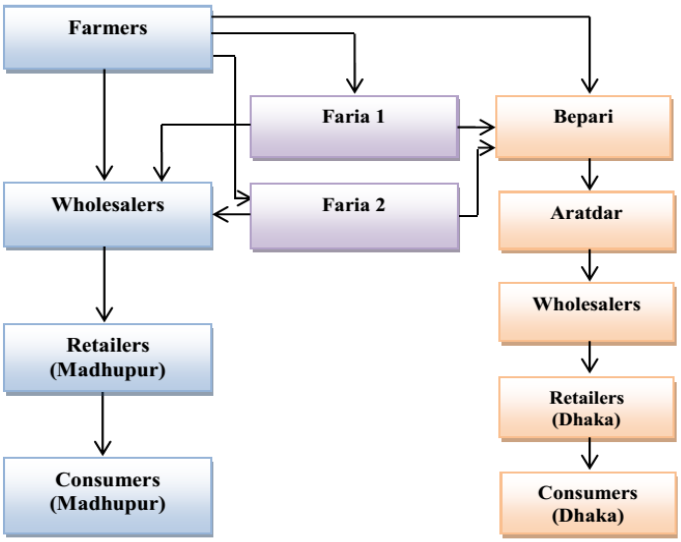
The NATP-2 (Hortex) project has been promoting development of value chain of bitter gourd in 5 Upazilas namely in Shibganj, Palashbari, Kapasia Khagrachari Sadar, and Muktagacha where generally land is high and soils are suitable for cultivation of banana. In fact, those Upazilla are famous for commercial banana cultivation. Among all the Shibganj in Bogra produce higher 26000 MT, Kapasia 6800, Palashbari 4950, Khagrachari Sadar 3950 and Muktagacha 1200MT per year as records from upzazila level DAE officials. All the upazla Hortex will work with 20 CIGs through CCMC establishment.

Table 60: Banana production status in Hortex selected areas

	Banana	Shibganj	Palashbari	Kapasia	Khagrachori Sadar	Muktagacha
1	Total farmer in Upazila:	77800	55450	68700	20100	67976
2	CIG under Hortex Foundation	20	20	20	20	20
	Total CIG	600	600	400	400	400
3	Banana Farmer	3550	1650	3850	600	70
4	Cultivated land (ha)	16500	14450	28095	6450	49826
5	Total area of Banana Cultivation (ha)	2300	330	710	250	80
7	Total Banana production (MT)	26000	4950	6800	4950	1200

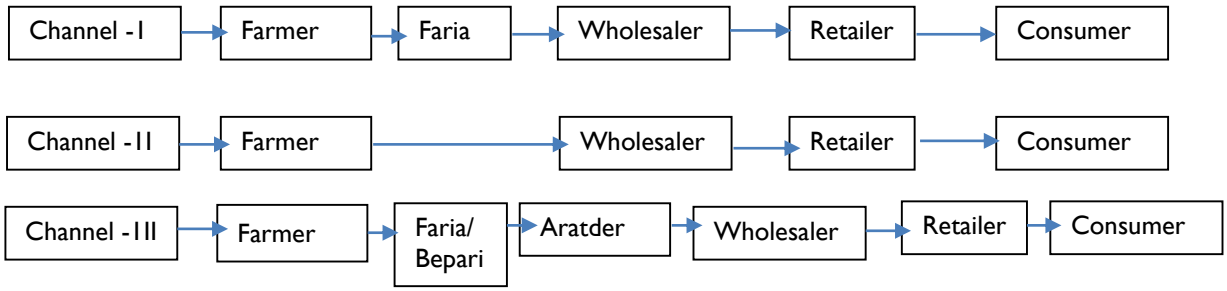
- **Value Chains of the Banana:**

As per discussion with producers, traders, CIG members, CCMC representative, other VC actors UAO and SAAO in the selected banana clusters it was found that in every upazila there are plenty of banana are producing. It has established market and market chain. Traders are doing multiple product business along with other vegetable. Usually producers harvest / pick banana twice in a week and sale nearby market, or to the local traders called faria/ Paiker. Some time they sold from their field also. Local faria and Paiker sold to the nearby market to the regional large trader via Aratder. Aratder take some sales commission or some do trade themselves. Regional trader they used to come from Dhaka or local trader also do the regional trade. These regional traders brought to Dhaka market (or regional large market) sale to another trader via another aratder. These traders may be retail or some of large buyer again sale to the retailer. Retailer sale direct to consumer. In Dhaka in between there are supplier purchased banana from Aratder/wholesaler and supply to the super markets or to the restaurants. In every steps of the transaction there are transaction cost, grading sorting, transportation, profit/loss, other overhead e.g. labour, rent, commission etc. Those are selling to super shop usually they do the little more post-harvest work like cleaning, grading and sometimes packaging. Hence CCMC can take the market opportunity direct to supply super shops or large level wholesale buyer.



Value Chain Map 8: VC map of Banana

Results suggested that various actors are involved in banana marketing. The principal actors include growers, Faria, Bepari, Aratdar, wholesalers, retailers and consumers. Faria are of different kinds. For example, some Faria do business without any running capital, whereas others do business with their own capital. The principal buyers of banana in the region are the Faria and Bepari. The growers generally bring their bananas in the assemble market, and sell either to the Faria or to the Bepari. There are two types of Bepari, local (50%) and the rest 50% from different destination markets like Dhaka and other cities/towns/divisions. The growers and the Bepari do not pay any toll/commission to the market committee.



Value Chain Map 9: Market chain of Banana VC

From the market scenario, if climatic condition and market dynamics is normal farmers are getting more profit (63%) than other VC actors in the value chain, producers are also adding value more 53%. Retailer earned 20% profit with adding value 15%, faria and paiker get same profit 7% and added value 5% each. Dhaka level aratder and wholesaler also earn 3% profit with adding 3% value. The value progression along with banana value chain as shown in below table.

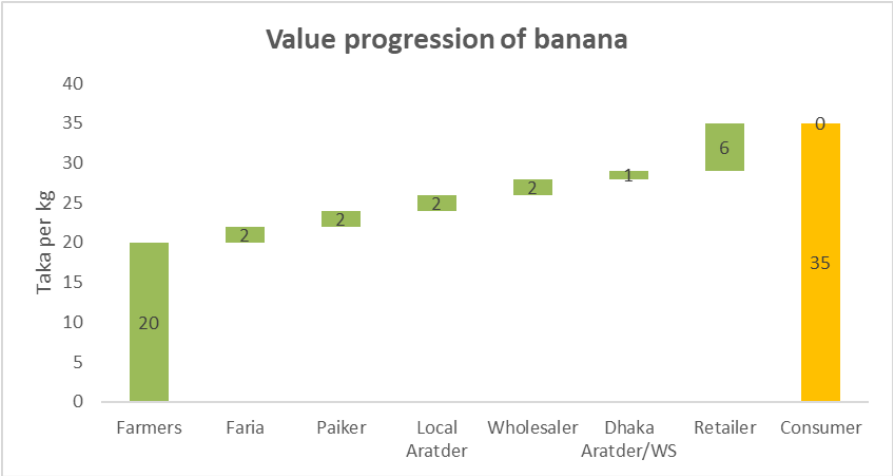
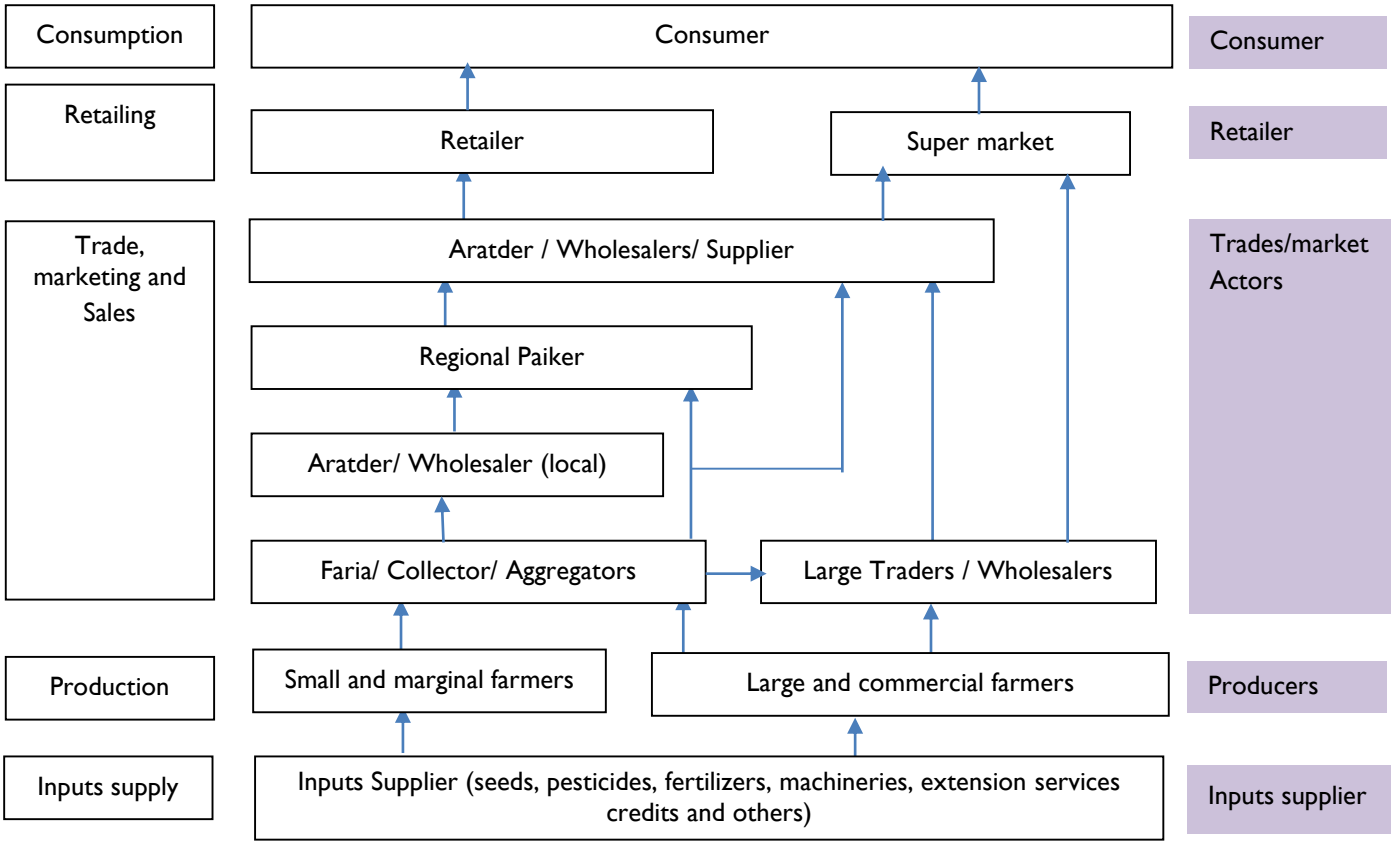
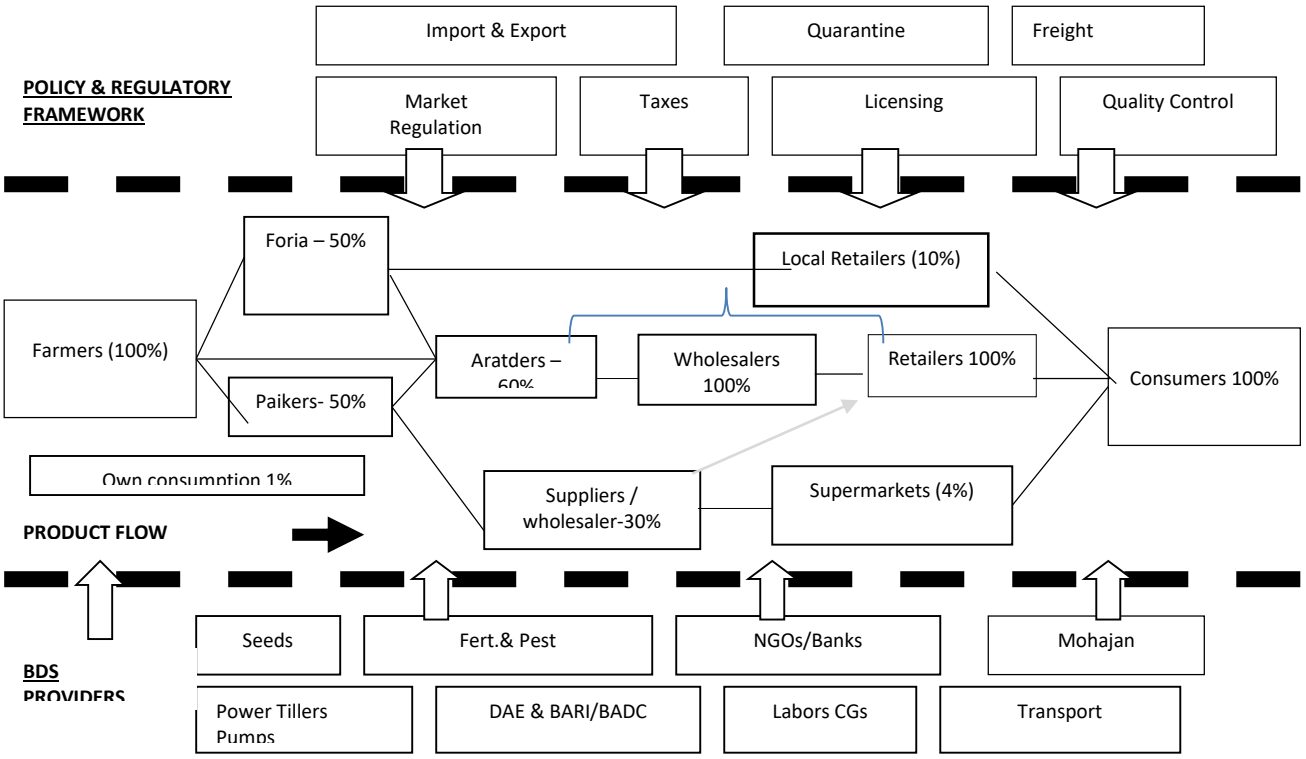


Figure 43: Value chain progression 0of Banana VC

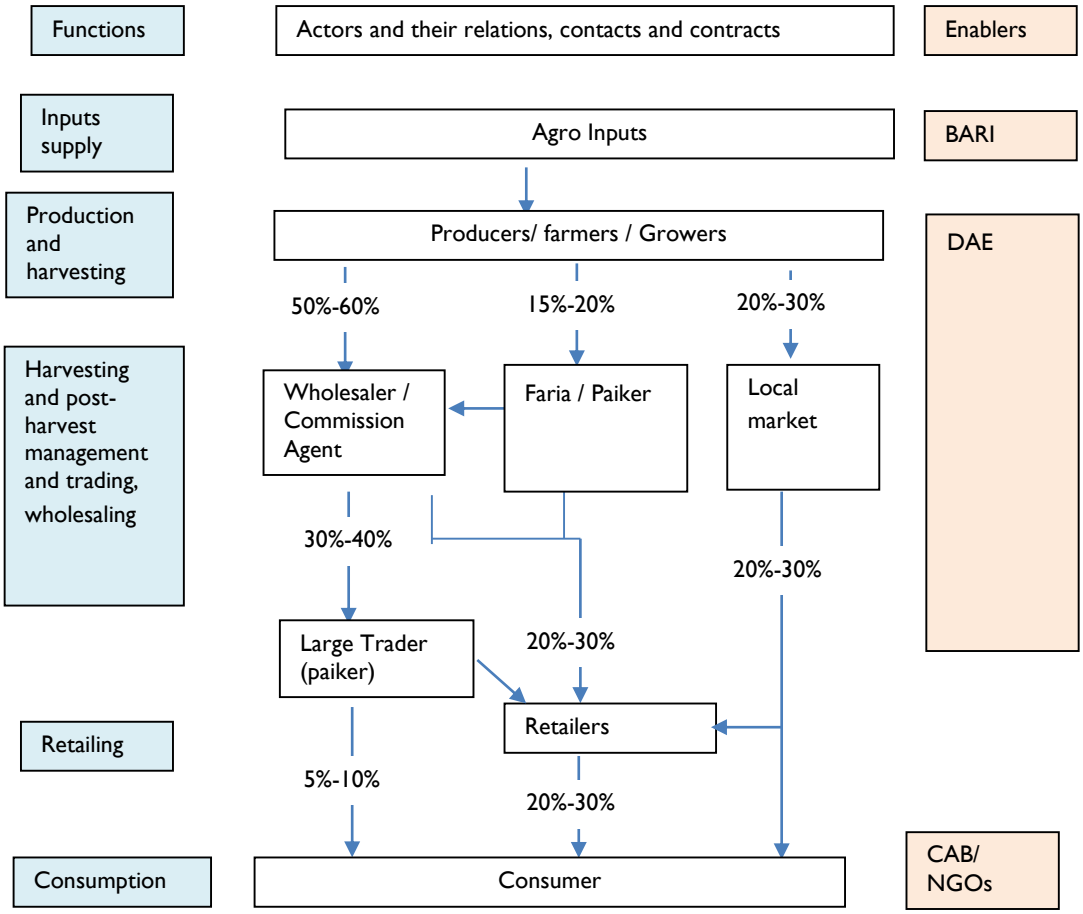
Table 61: Value proposition along with Banana VC							
	Purchase	**Sales**	**Price difference**	**Value Addition**	**% of value addition**	**Profit**	**% of Profit**
Farmers cost	10.5	20	9.5	10.5	53%	9.5	63%
Faria	20	22	2	1	5%	1	7%
Paiker	22	24	2	1	5%	1	7%
Local Aratder	24	26	2	1	5%	1	7%
Wholesaler	26	28	2	1	5%	1	7%
Dhaka Aratder/WS	28	29	1	0.5	3%	0.5	3%
Retailer	29	35	6	3	15%	3	20%
Consumer	35						

Table 62: Cost price of banana VC							
Traders	Farmers	Farias	Paiker	Aratder	Suppliers	Wholesalers	Retailers
Farmers	20						
Farias	20	22					
Paikers	20	22	24				
Aratdar	20	22	24	26			
Suppliers	20	22	24	26	28		
Wholesalers	20	22	24	26	28	29	
Retailers	20	22	24	26	28	29	35





Value Chain Map 10: Banana VC map



Value Chain Map 11: Banana

- **Mutual Contact, Contract, Relation, Trust along with banana value chain**

Contacts:

90% banana producers have contact with fertilizer, pesticides, and seed retailers. Farmer to farmer good contact 80%, above 60%-70% contact with the faria, paiker, retailer suppliers and with pumps, power tillers, minimum contact super stores. with retailers. Least contact found with super market 10%. Farmers have good contact with DAE 70%, less in research organization like BARI, BADC below than 25%. Farmer have good contact with transporters (80%) and labors 90%.

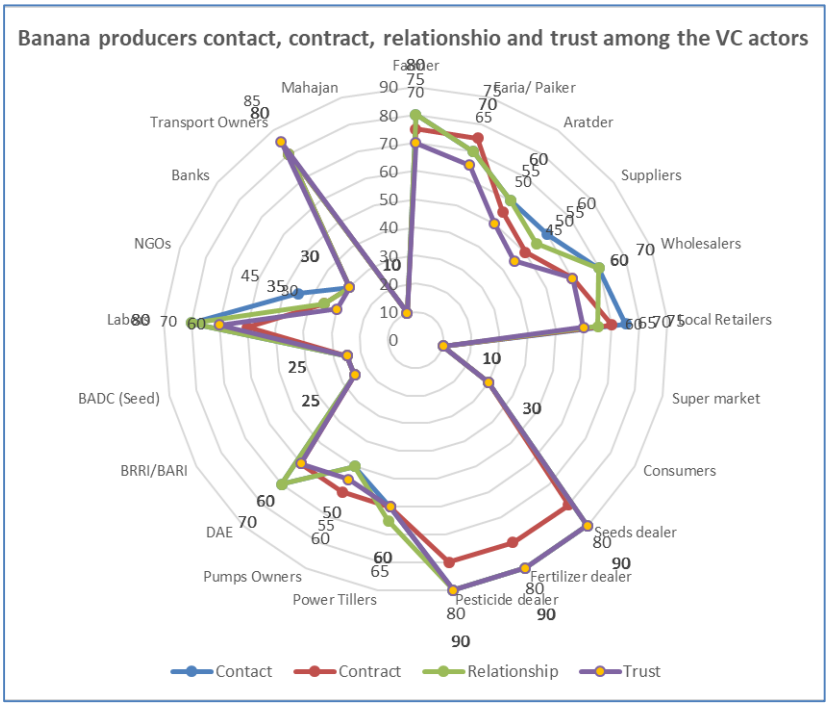


Figure 44: Banana producer contact, contract, relationship and trust on VC actors

Contract

The FGD meetings also revealed the frequency of the producers' contract with the value chain actors expressed verbally, none of the farmers have any formal or written contract with any of the VC actors or even stakeholders. There was no written or MOU and therefore no proof. Farmers/ producers went into contract with 21 different VC actors informally and oral.

About 50-65% banana producers stated have verbal contract with Faria, Paiker, supplier and aratder, less with super markets. With all inputs retailers, banks, and labour contractors have some extent of informal contract about to 80%. All research organization, super market has small information about it. But 60% farmers stated that they have contact with DAE and transport providers. Farmer to farmer relationship seems highest about to 80%.

Relationship

The depth of relationship of the banana producer was expressed in percentage from FGDs. These are verbal expressions of the farmers between them or with the 21 different VC actors. The seed, fertilizer and pesticide dealers had come in close relation with 90 percent. Other relations with DAE and neighbor farmers 70% to 80%. Relationship with faria, pikers and aratder calculated ranges from 55%-70%, Labour 90%, BADC/BARI 25%, transport owners 80%, NGOs and suppliers 30%, local retailers 70% and very less with super markets 10%.

Trust on VC actors

The FGD meetings also led to discussions on the level of trust of farmers on the VC actors. The data expressed as percentage shows the feeling of trust. The trust level on an average ranged high from 20% to 100% among farmers attending the FGD meetings. 90% farmers trusted fertilizer dealers, seed retailers, and pesticide dealers and shops. A high level of trust on 45%-70% on faria, Paiker, aratder, suppliers, wholesaler, and retailers. Less trust on supermarket (10%). On extension service DAE existed trust about 60%. BADC, and research organization below average level of trust, no trust on Mahajan. All farming groups seem to have low level of trust (30%) on the consumers.

Table 63: Banana producers contact, contract, relationship and trust along with VC actors					
No	**Banana Value Chain Actors**	**Contact**	**Contract**	**Relationship**	**Trust**
1	Farmer	80	75	80	70
2	Faria/ Paiker	70	75	70	65
3	Aratder	60	55	60	50
4	Suppliers	60	50	55	45
5	Wholesalers	70	60	70	60
6	Local Retailers	75	70	65	60
7	Super market	10	10	10	10
8	Consumers	30	30	30	30
9	Seeds dealer	90	80	90	90
10	Fertilizer dealer	90	80	90	90
11	Pesticide dealer	90	80	90	90
12	Power Tillers	60	60	65	60
13	Pumps Owners	50	60	50	55
14	DAE	70	60	70	60
15	BRRI/BARI	25	25	25	25
16	BADC (Seed)	25	25	25	25
17	Labors	80	60	80	70
18	NGOs	45	35	35	30
19	Banks	30	30	30	30
20	Transport Owners	80	80	80	85
21	Mahajan	10	10	10	10

- **Main constraints and probable commercially viable solution (banana)**

Table 64: **Banana VC constraints and viable solutions**

Sl.#	Constraints	Probable solution
A.	**Technical (pre-production harvesting, post-harvest, and product development)**	
1	Absence of business oriented crop planning (business plan) for banana production to produce year round banana	Training and capacity building of the CIG/CCMC members on business planning as per market demand and contractors requirements
2	Poor quality inputs (seed, fertilizer and pesticides)	Facilitate and linkage to get good quality commercial varieties of seed, good quality fertilizer, pesticides (linkage between CCMC and input supplying companies)
3	Pest infestation in banana production (panama disease, rhizome rot)	Training on disease and pest management of CIG members and CCMCs (linkage between CCMC and input supplying companies) Introduce IPM Demonstration with CCMC
4	Inadequate knowledge and poor practices on post-harvest management	Training and capacity building on post-harvest management of the CIG members/CCMCs
5	High wastages, rotten of vegetable rapidly, causes wastage	Training and capacity building on post-harvest management of the CIG members/CCMCs
6	No or poor packaging in banana	Facilitate good packaging system through CCMC and private sectors enterprises
7	No cool chain and inadequate transportation mainlining from harvest to consumer market	Facilitate to raise awareness and capacity building on cool chain management Support CCMCs/CIG or enterprises with refrigerated / refer van for transportation and sales
B	**Market Access**	
1	No direct market linkage to get profitable price	Facilitate linkage among the large scale traders, processors and supermarkets with CIG members and CCMCs
2	Lack of fair price	Facilitate to get appropriate market information through ICT and other buyers
3	No contract farming in banana cultivation	Facilitate to start formal contract farming with processors, large scale buyers and exporter
C	**Organization and management**	
1	Inadequate market monitoring	Strengthen market monitoring system by DAM and Hortex together
2	Weak CIG and CCMC coordination with market committees	Facilitate to strengthen relationship trust, and connect with VC actors and market committees
3	No formal contract among the VC actors	Facilitate CCMC and CIG to form contract farming production system with Large scale VC actors with good relationship, contact, and trust
D	**Finance**	
1	Inadequate access to finance for traders and Post-harvest management	Facilitate and advocacy on access to loan for traders with financial institutes
2	Absence of institutional financing in perishable product business for the VC actors	Advocacy and linkage with the relevant financing institutes
E	**Infrastructure**	
1	Transportation cost is high	Facilitate to use cool van, and group transportation system by the CCMCs/CIGs
2	No Cold Storage facilities	Facilitate to establish multipurpose cold storages through private sector enterprises
4	Insufficient space and equipment's for washing, sorting, grading etc.	Facilitate to advocacy with the market committees to allocate more space in the market and widening CCMCs place together
F	**Regulatory**	
1	No quality control and Quality assurance policy	Establish QA/QC cell in the DAE along with Hortex
2	No quality certification agency	GAP and other quality compliances certification system to be established

3.7.3.6 Aromatic Rice VC:

- **Introduction**

Rice is the most important food crop in Bangladesh. Among the leading rice growing countries of the world, Bangladesh ranks fourth in both rice area and production. About 75.01% of total cropped area of Bangladesh is used for rice production, with annual production of 34.71 million tons from 11.28 million hectares of land (Bangladesh Bureau of Statistics BBS, 2015). Most of the aromatic rice varieties in Bangladesh are indigenous traditional type, photoperiod sensitive and are grown during Aman season in the rain fed low land ecosystem. It is estimated that 30% of the rice lands were covered by aromatic rice cultivars during Aman season in northern districts of Bangladesh.

This special type of rice is grown in the northern districts such as greater Dinajpur, Rangpur and Rajshahi. The most popular varieties are Kataribhog, Kalizira, Bashmoti, Badshabhog, Khirshabhog, Chinigura and BRRIdhan-34. The yield of aromatic rice varies from 0.70-2 MT per hectare, which is lower than other HYV. Aromatic rice has high demand, especially in urban markets with higher market price. Traditionally small and marginal farmers are growing aromatic rice as commercial products and sold paddy (unhusked) to the market either at the farm gate or in local markets. So that farmers are deprived to get higher prices as the prevailing urban consumer market. The traders or wholesalers took the market opportunity and share maximum of the premium price. Bangladesh produced 34.57 million MT of rice in FY 16, of which 2.6 million tons were of aromatic varieties.

The farmers were produced 2.97 lakh MT aromatic rice in 2013 and 1.66 lakh MT in 2012. The farmers had cultivated aromatic rice on over 1.58 lakh hectares of land and produced 2.97 lakh MT of different variety of aromatic rice with an average yield rate of over 1.876 MT per hectare in the region this time. The farmers had mostly cultivated BRRIdhan 34, 37 and 38, sometime BRRIdhan 50, Kalijira, Kataribhog, Chinikatari, Chinigura (Zirakatari), Philippine Katari, Jotakatari, Rasunbhog, Badshabhog, Nenia, Uknimadhu, Khirshabhog, Basmati, Tilakpur, Hawaii, Dulabhog, Begunbichi, Babuibhog, Binnyaful and some other varieties of aromatic rice.

Aromatic rice varieties are rated best in quality and fetch much higher price in international market. Aromatic rice plays a vital role in international rice trading. Bangladesh has a bright prospect for export of fine rice thereby earning foreign exchange. In spite of low yielding of aromatic rice, it requires less input compared to coarse rice.

Cultivation of Aromatic fine rice gained much popularity among the farmers in the northern district in recent years due to its bumper production and high price. After achieving self-sufficiency in food grain, farmers of the district are now showing interest towards producing the export quality fine aromatic rice. Every year, the cultivation of the variety is increasing for getting desired output against the crop. During the last two and three years, farmers are getting fair price of aromatic fine rice. They are now inspired to cultivate more aromatic fine rice. The growers cultivated four varieties of aromatic fine rice—BRRI dhan-34, katarivog, jamai vog, philipine katari etc— which is famous for special flavor and fineness. It is mostly used in preparing polao, biriani, payesh, khichuri and zarda.

Whereas, so many prospects are in sight, achievement of the goal is fraught with a number of production, marketing and trade related problems. It would therefore be pertinent to examine the relevant issues for assessing the prospect of production and export of aromatic and fine rice in Bangladesh. Some works have been done on production and marketing of aromatic fine rice, including determination of financial costs and returns or profitability of aromatic fine rice. However, little works have been done on determination of economic profitability of these varieties of rice. This paper examines the profitability of aromatic and fine rice production, from the point of view of both farmers and the country as a whole.

Aromatic rice is becoming a cost-effective and beneficial economic source commodity, and having recognized this, the Government of Bangladesh is intensifying efforts to produce the aromatic rice variety on a larger scale through collaboration with private farmers, according to Research Scientist through DAE and NGOs.

Scented or aromatic rice is nature's gift to the sub-continent and human kind at large. Compare to other classes of rice, aromatic rice is highly demanded and get better premium price in global market due to its pleasant aroma, superfine long slender grains with delicate curvature, remarkable linear elongation and excellent flaky soft texture on cooking.

Although the production of aromatic rice per unit area is lower than the ordinary rice but the farmers are getting more price than ordinary rice and there is assured market of their produce in the state, only for this reason the farmers are showing interest regarding the cultivation of aromatic rice and the area under aromatic rice is increasing day by day.

- **Seasonality of Aromatic rice**

Rice is cultivated in Bangladesh throughout the year as Aus, Aman and Boro. Transplanted Aman is generally cultivated in July – November, Boro in December-May, and Aus in April - July cropping seasons Aromatic rice is mainly cultivated in Amon season (July- November). Few farmers cultivated aromatic rice in Boro season (December to April).

Most of the famers were cultivated HYV BRRI dhan -34 (Amon season) and BRRI dhan-50 (Boro season). During the FGDs and KII that the farmers were cultivated BIRRI dhan-34 (Zira dhan) in Amon season but few of the farmers were cultivated BRRI dhan-50 in Boro season. Besides it, they cultivated local variety of aromatic rice but it is very little amount of land.

Table 65: Banana production cycle

Months	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPP	OCT	NOV	DEC	
	Pous	Magh	Falgoon	Chaitra	Baishakh	Jaistha	Ashar	Srabon	Vadra	Aswin	Kartik	Agrahyan		
Winter														
Main crop														

Table 66: Rice Production area and Production in Dinajpur District

		Cultivated Area (ha)	Cultivated Area (ha)			Cultivation by variety (MT)		
			Hybrid	HYV	Aromatic	Hybrid	Uposhi	Sugondhi
Amon	Chirirbandar	23,315	200	20,400	2,715	722	57,732	4,534
	Chirirbandar	18,195	1,370	16,500	325	6,736	67,932	1,218

Table 67:Aromatic rice production status in selected areas

	Aromatic Rice	**Birganj**	**Chirirbandar**	**Nakla**
1	Total farmer in Upazila	58,900	86,000	32,045
2	CIG under Hortex Foundation	20	20	20
	Total CIG	400	400	400
3	Aromatic Rice Farmer	2,500	1,500	8,750
4	Cultivated land (ha)	33,330	30,250	30,250
5	Total area of Aromatic Rice Cultivation (ha)	4,000	750	1,250
7	Total Aromatic rice production (MT)	12,000	2,250	3,350

- **Aromatic Rice Cultivation Technology – Knowledge, Attitude and Practices**

None of the respondents stated that they have practices any modern technology for production of aromatic rice, traditionally cultivate rice. As per FGDs and KII with the relevant stakeholders, DAE representative they also support and stated similar information but most of them use HYV variety like BRRI dhan-34, very few local varieties. Respondent have very limited knowledge on insect pest and disease management, no

knowledge on inputs quality parameters and sourcing of it. During the FGDs found that none of the respondent understood the quality parameters of the inputs, and none of them satisfy about the quality of those inputs.

None of them received any training for aromatic rice cultivation and nor seed production, respondent have limited knowledge on modern technologies of the rice cultivation, special care, grading sorting, and market related information. Therefore, relevant training and capacity building process is required for the development of the aromatic rice sector in the targeted areas.

Inputs Source for Aromatic Rice Cultivation

During the FGDs it was also found that marginal and small farmer's traditionally cultivate aromatic rice in the locality following modern rice production technologies with the help of DAE and other organizations. Farmers are too eager to cultivate the aromatic rice due to high market value.

Sources of inputs (Seeds, Fertilizers, pesticides):

From the survey it was found that 80% respondents were collected seeds for aromatic rice cultivation from local retailers, 44% collected from neighbor farmers and 6% Seed Company for cultivation purpose. During the FGDs the respondents were used sources for collecting aromatic rice seeds from local farmers, local retailers, few amount of collected from Seed Company and BADC. Farmers also use multiple sources of seeds.

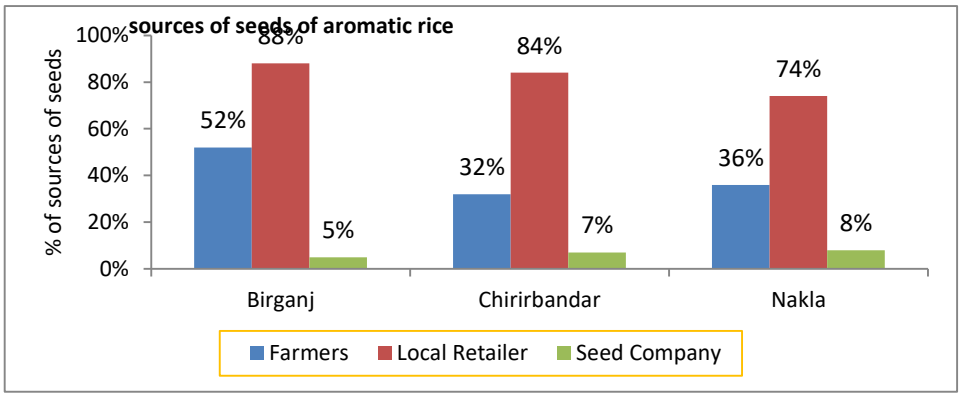


Figure 45: Sources of Aromatic Rice Seeds

From the survey it was found that 75% respondents were collected inputs (fertilizers, pesticide etc) for aromatic rice cultivation from local retailers, 60% collected from Paiker for cultivation purpose. None of the respondent understood the quality parameters of the inputs, and none of them satisfy about the quality of those inputs. During FGDs it was found that input retailers were the most preferable inputs sources, rarely had they received inputs from government organizations in special occasion. Similar trend found in all areas of the survey.

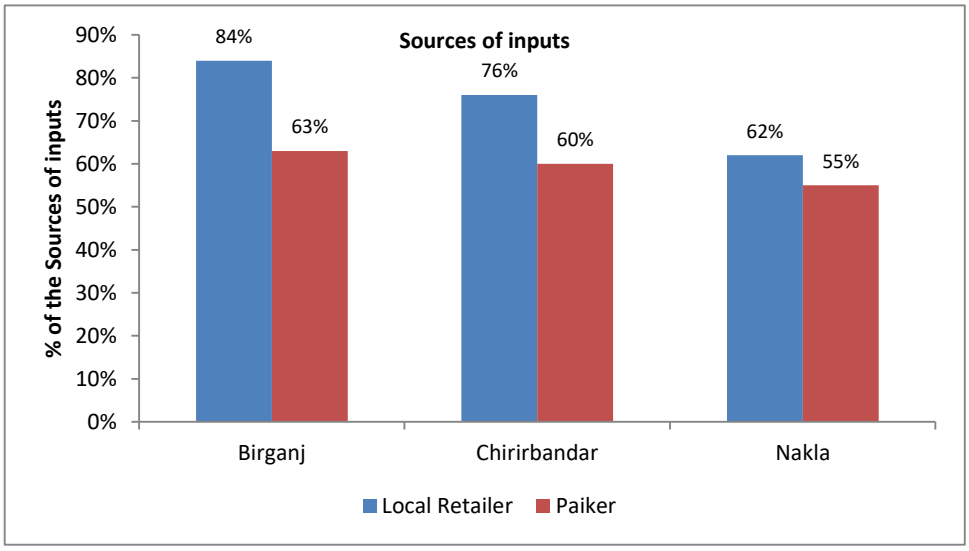


Figure 46: Sources of Inputs

Sources of Agricultural Extension Services:

Most of the respondents have received services from local inputs retailers (60%), from the farmers (30%) and DAE (10%). Usually they have received services or extension relation suggestions from multiple sources. Same results found in all areas. During FGDs it was found that the farmers were the most preferred to input retailers services, rarely had they received services from government organizations and others organizations.

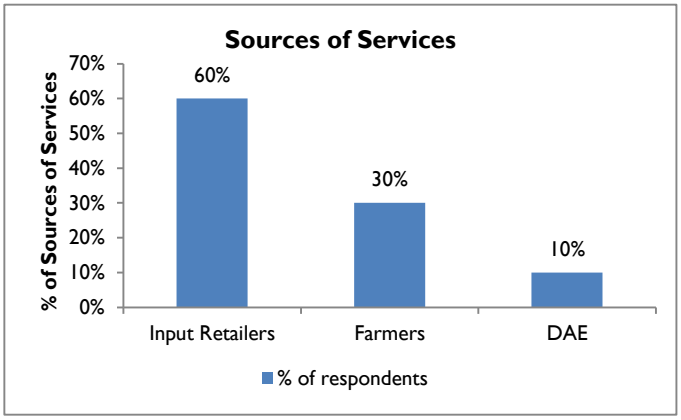


Figure 47: Sources of Ag. Extension Services

Cost of Aromatic Rice Production:

Production cost of aromatic rice is calculated in terms of unique land size of 33 decimal and same cost variables, based on respondent's answers. It was found that land lease value cost (47%), followed by harvesting 12%, land preparation 7%, seed & seedling plantation 3%, irrigation 3%, fertilizer 5%, pesticides 4%, post-harvest management 5%, transplantation 7%, intercultural operation 6%, however total cost of production calculated as Tk.12,050 per one Bigha land of aromatic rice production. Average production per Bigha land calculated 433 kg, and sold Tk.36 per kg, however total net income average is Tk.3,472. Upazila wise variations also calculate and found net income per Bigha higher in Birganj, Tk.4264, followed by Chirirbandar Tk.3477, NaklaTk.3111. From the survey findings, it was also found that 4% aromatic rice was used to own consumption and 96% were sold to the market. During FGDs findings were shown that most of the respondents were sold their aromatic rice and a few number of people kept in own consumption.

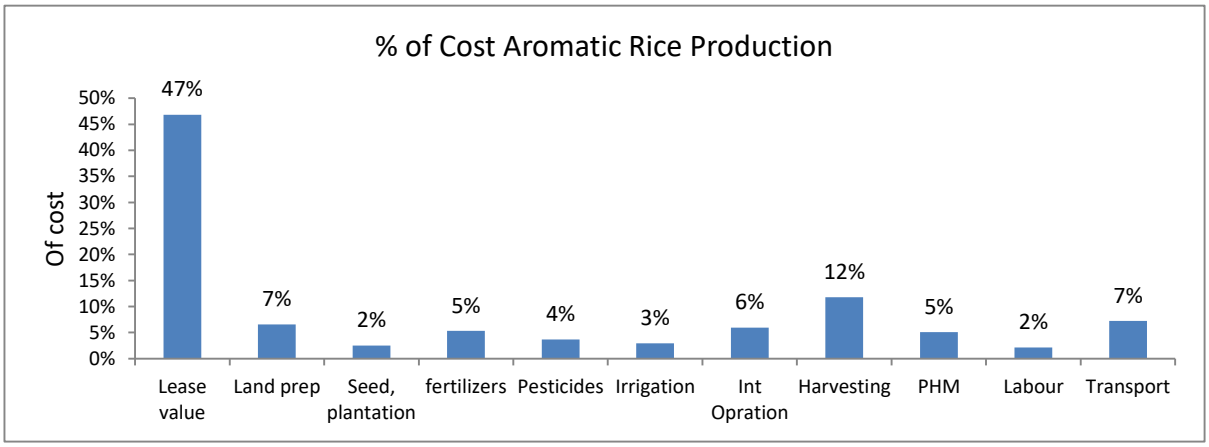


Figure 48: Cost of Aromatic rice Production

Access to Market – Assessment of Market potential of the Aromatic rice

During the FGDs it was found that 96% of the produced aromatic rice was sold to the market especially to the local Faria (local level traders) only 4% farmers were kept for their own consumption. All of the producers sold personally as spot bargaining with local traders i.e. Faria and no group sales were found during the survey. So that VC strengthening intervention would be the right approach to boost the aromatic rice market and producer's income enhancement.

Producers were sold most direct to the local faria from their home and traders were communicated time to time during harvesting. Traders (local Faria) offers competitive price to the producers as they are many in the locality, traders also do some sort of post-harvest management i.e. sorting grading and bulk packaging.

- **Existing Value Chain of Aromatic rice in the project area in Bangladesh**

A value chain is defined as organized linkages among groups of producers, traders, processors and service providers who join together to improve productivity and the value of their products. By joining together the actors in the value chain increase competitiveness and are better able to maintain competitiveness through innovation. The limitations of each single actor are overcome by establishing synergies and governance rules aimed at producing higher value.

A large number of people are involved in the production and marketing of the aromatic rice. The imbalance in the supply-demand in aromatic rice is increasing every year due to low production coupled with an increased population. Realizing the increasing importance of aromatic rice as smelted rice, it was a timely intervention for diversify aromatic rice cultivation and expand its seasonality during the year round, simultaneously to carry this opportunity it is also important access to market for farmers, access to finance for cultivation and inclusion in the mainstreaming of VC in the market and market channels. However, during the FGDs and few secondary reports found that the process of aromatic rice marketing the intermediaries are involved in a chain are Faria, Bepari, Aratdars, Wholesalers and retailers. In the study area Faria purchased 61% percent from producer, local paikar 77%, and outside traders 2%, multiple options were reported by the respondents. In all upazila has shown similar results i.e. most sold to the local paiker. Farmers are lack of modern knowledge on good agricultural practices, dealing with poor quality inputs and application knowledge, limited access to market, causing wastages and poor quality of the produces and sold at a lower price to the market.

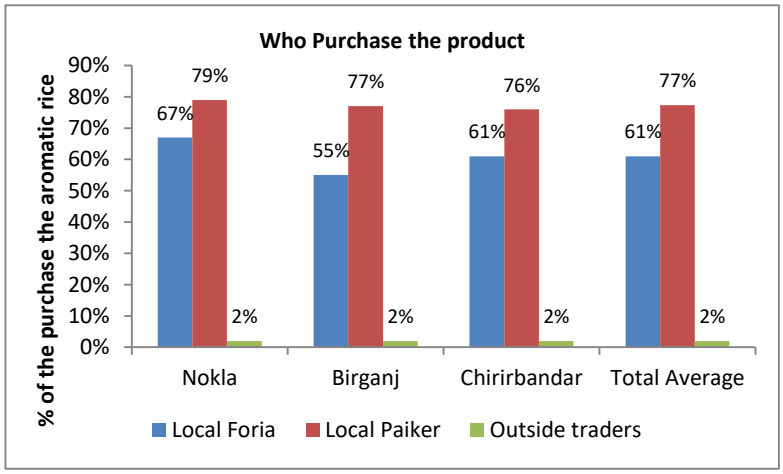
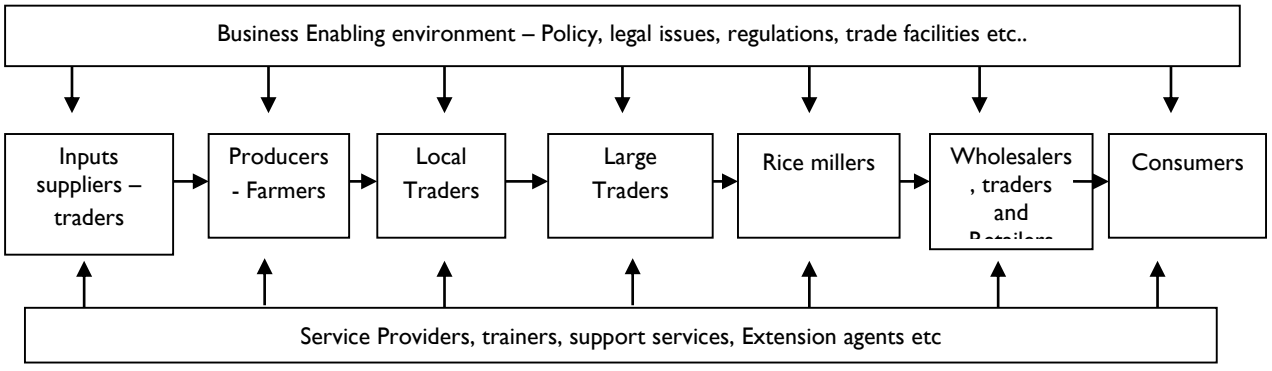


Figure 49: Main buyer of the Aromatic Rice



Value Chain Map 12: Aromatic rice

They produce and bring their product to sell in their local market nearby their village areas or sometimes sold direct from home.

Local faria or local wholesalers purchases their product from the farmer. Basically, they fixed the price paid to the farmer at spot bargaining. They deal with the paiker or outside wholesaler. Local wholesaler sends their product lot to the different division mainly to Dhaka, according to the market demand and market price.

Farmers are sold their product at home 65% and to the local market 63%, sometimes both. Regionally similar trend found in all upazila.

None of the respondents were sold their aromatic paddy direct to the millers or processors.

98% respondents were sold their products individually and only 2% sold in bulk to the large buyers.

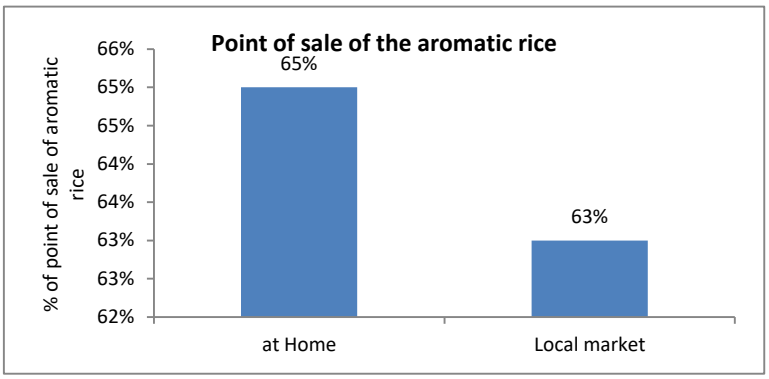


Figure 50: Point of Aromatic Rice Sales

Therefore, it is found that the aromatic rice has high market potential interns of price, income meet demand gap, high price if it ensure financial support to the producers, VC actors, alongwith necessary training on production, post-harvest, market linkage, and business management support services.

Table 68: **Price of buying the product Tk./Kg (Aromatic rice**

Traders	Farmers	Farias	Paiker	Aratder	Suppliers	Wholesalers	Retailers
Farmers	40						
Farias	40	42					
Paikers	40	42	45				
Aratdar	40	42	45	47			
Suppliers	40	42	45	47	47		
Wholesalers	40	42	45	47	47	55	
Retailers	40	42	45	47	47	55	70

- **Constraint of Aromatic Rice Production:**

Use of quality seed is a prerequisite for good yield of crop. For production of aromatic rice, the seed issue is more critical because a substantial proportion of investment is anticipated to be exported after proper milling and processing of the paddy crop. Farmers generally use their home-produced seeds, a large proportion of which are not processed and stored under ideal conditions. There seems to be lack of organized efforts for scientific processing and storing of seeds of aromatic rice varieties. The traditional aromatic varieties have relatively lower yields. Although the developed varieties released by the BRRI have promising yields like BRRI dhan-34 and BRRI dhan-50farmers generally feel skeptic in adopting the new varieties, particularly in replacing the old varieties by the new ones, because of the fear of losing some of the traits of the old varieties.

The aromatic rice varieties are very sensitive to the cultural practices followed in the production. Farmers complained that they had been observing gradual loss of aroma and fineness of the rice varieties, possibly because of imbalanced of manures, use of excessive fertilizers and cultural practices. The other problem is the frequent lodging of rice plants which seriously affect grain qualities. The lodging of plants is also attributed to imbalanced use of inputs and improper cultural practices. Since the aromatic rice varieties are grown during the T.Amon season, they are generally produced under rainfed condition. Shortage of rainfall often

affest production of the rice varieties. Provision shuld be made for supplentary irrigation to protect the crop from any possible drought during the Kharif II season.

Fluctuation of price seriously affects production of the aromatic rice varieties. Since the aromatic rice varieties have relatively thinner domestic market, and export of rice is constrained by many trade and non-trade related barriers, lack of proper combination of domestic demand and export avenues causes wide range of price fluctuation from year to year. This situation calls for concerted efforts towards establishing some form of vertical integration comprising production, marketing and trade in which farmers would be protected from any major fluctuation of prices of the rice varieties.

However, farmers are facing numbers of the constraints and problems to enter into the mainstream value chain market of the aromatic rice, some of them are:

- Lack of appropriate technical knowledge of aromatic rice production
- Insufficient supply of quality inputs e.g. seeds and purchased at high price
- Unstable market price and farmers did not get actual price
- Proper quantity and quality of inputs could not use on time due to financial problems.
- Production cost high and low production
- Lack of institutional technical support of aromatic rice production
- Lack of training of aromatic rice production
- Lack of appropriate services and markets to sale on time
- Lack of processing, value addition and storage facilities
- Overall appropriate financing supports for production, process and marketing
- Limited skills and access to services, resources, information, technology, finance and markets.
- Lack of interest amongst private sector actors to invest in developing the forward and backward linkages for small scale agriculture and marginalized farmers
- High disease and pest infestation and lower yield then other paddy cultivation
- Poor bargaining and negotiating capacity of the small scale and marginalized farmers
- Absence of climate adaptive and environment friendly agricultural practices especially in off season
- Lack of preparedness to mitigate shocks or stresses (financial, environmental, etc).
- Depletion in ground water levels resulting in high costs of irrigation.
- Declining soil fertility because of excessive use of chemical fertilizers

3.8 Consumer Perception along with selected VC:

- **Appropriate and Adequate Compliances for Safe Food:**

When asked what they believe the most appropriate compliances for safe food, the majority of the respondents (87%) cited gaining BSTI certificate was the best example of abding by quality compliances; 19% considered ISO certificates is the best options, while 4% respondents thought that it was HACCP. None of respondents expressed any opinion on GMP and GHP as these concepts are introduced recently. BSTI is widely known as it has been operating for many years.

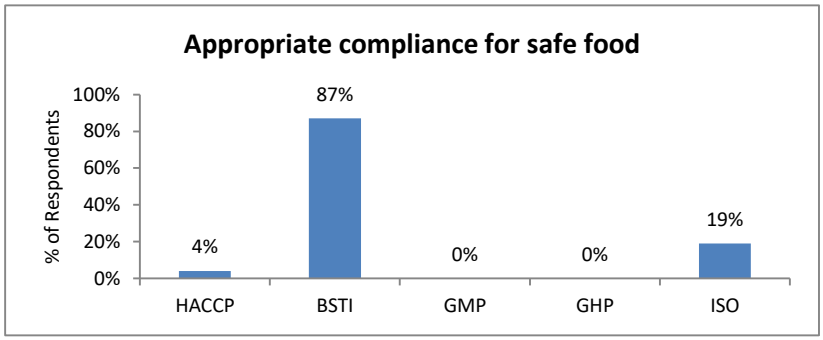


Figure 51: Appropriate Compliances for Safe Food

- **Perception on Certification System:**

Respondents were interviewed on their level of their awareness on quality certificates; 28% said certification system is very poor, followed by groups of 27% who feel processors should strictly follow certification system, while 26% of respondents considered processors moderately followed certification system. It appeared consumers had mixed feelings on certifications and has no clear knowledge about certification followed by the stakeholders.

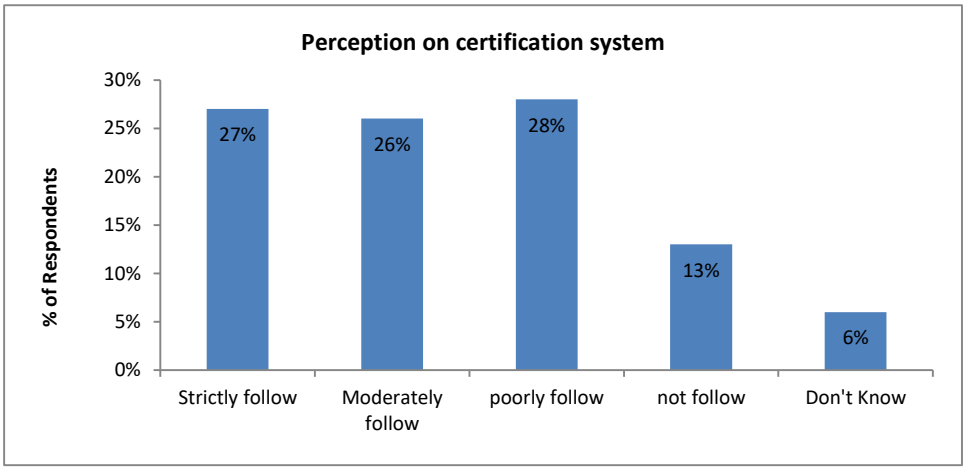


Figure 52: Perception on certification system

- **Willingness to pay Premier Price for Good Quality and Certification product:**

Consumers' willingness to pay premier price for better products was assessed as whether they were ready pay extra for quality products and certification. Consumers showed interest to pay premier price, if quality and certified products are available. 90% buyers responded "Yes" and only 9% replied "No" while 1% had no opinion. However, most of the consumers are ready to pay Premier Price for good quality and certified products.

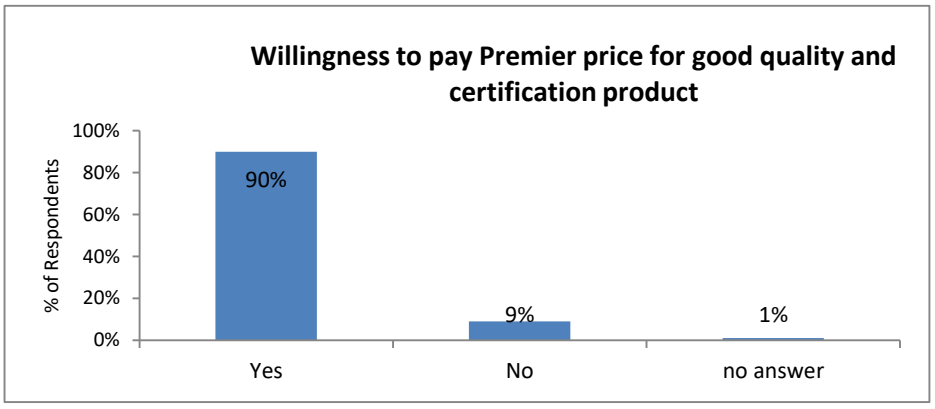


Figure 53: Willingness to pay premier price for good quality and certification product

- **Suggestions to Processor:**

Consumers' perception was assessed to know what quality control system processing industries should follow. Roughly, one-third of the consumers felt that quality compliances for processing industry should be GAP (36%), followed by traceability (21%) and GMP (26%); and 61% felt that all of the systems combined (HACCP GMP, GAP, GMP, GHP). About 41% respondents felt that processing industry should follow safe food certification system. Roughly, 28% opined that processing industries are motivated to follow consumer friendly policy which is only 4% higher than the baseline estimate. About 65% observed that product expiry date is mentioned on packet, far less than baseline estimates (89.30%).

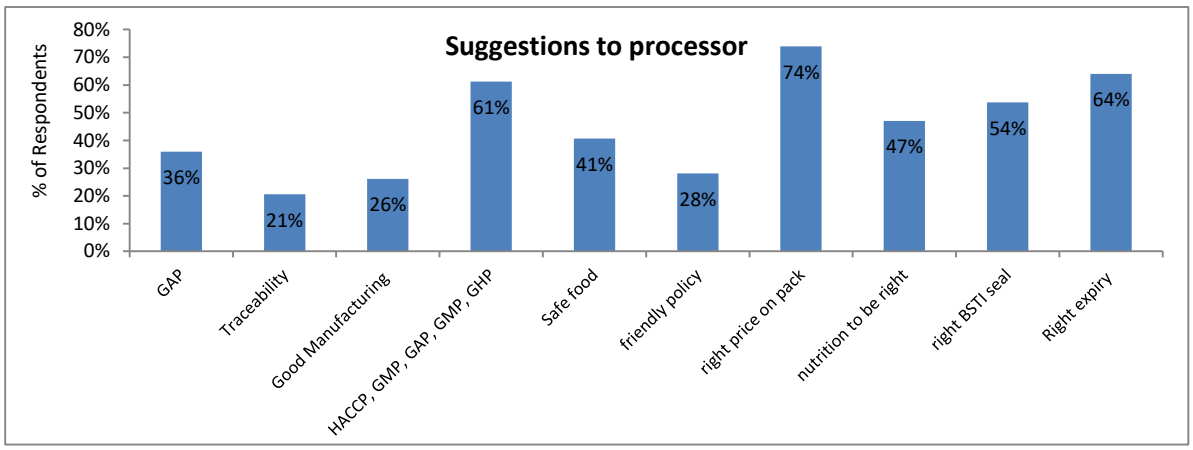


Figure 54: Consumers suggestions to processors

3.9 Women Empowerments and Participation in Value Chain

The role of women appears to be mainly confined to production and post-harvest management. It does not appear to be culturally acceptable for women to trade in the markets. Women vegetable growers felt that more direct links to markets is needed. As per SaFal project experience in horticulture, 88% women are involved in postharvest activities and 70% in harvesting at the farmers' level not in the market (rural or urban). There is an ample opportunity to create rural women employment for PHM, grading sorting, packaging and harvesting.

In the agricultural value chains, the women play four major roles - (1) as a wife of the farmer, (2) as a farmer, (3) as a day laborer, and (4) as an entrepreneur. As a wife of a farmer, women are mostly involved in homestead-based activities such as managing seed (if they keep seed from their own field) and post-harvest management (drying, cleaning and storing) in crop sub-sector. They also take part in production planning and decision making jointly with husbands. They are hardly involved in field activities because they are not socially acceptable to do it. A few wives of the farmers mentioned that they had done field works when crop fields are nearby of their homestead. However, the role of a farmer's wife varies by type of value chains to value chain. The wives are found to play a vital role in vegetable cultivation where they are actively involved in production planning, growing seedling, transplanting, intercultural operation in crops like weeding and sanitation, harvesting, cleaning, sorting, and packaging for marketing. The selling of all products is mostly done by the husbands or sons because it requires carrying at the marketplaces which are considered as a hard work for a woman. Moreover, most of the husbands mentioned that the marketplacesare not safe and suitable for women to trade. In peak season, wives of the farmers spend more than half of the day in crop value chain related activities, while rest of the time they spent oncaregiving and other family work. The wives are not paid for their services to the value chains but they become a custodian of the money earned from crop selling and took part in decision making for expenditure. With the consent of husbands, wives spend money to meet the need of the family. Compared to husbands, the wives have easy access to microfinance. In most cases, wives get microcredit (NGO loan) for their husbands to invest in their value chain activities. Most of the wives have a mobile phone and use that to know market information or advice for improved technologies from local service providers as and when needed.

A woman becomes a farmer mostly due to the absence of her husband (death of husband or husband live away from the family for jobs or business). In the total number of farmers, the existence of women farmers is very few. In the cycle of the value chains, women farmers are not playing the same role as a male farmer. They do not work in the field, nor taking their products in the market to trade. They sell their product at home or take help of son or another male for marketing. Some of them go to the nearby markets or retailer shops to buy inputs, while others take help of son or another male to get them. As like as male farmers, women farmers have contact with local service providers and some of them have taken their services as and when needed. Compared to the wives of the farmers, women farmers are more knowledgeable about crop production technologies as well as skilled in planning and decision making. They spend two-thirds of their daily time in value chain related activities in peak season. A few women farmers have access to microfinance. They feel the risk to take it. They don't know about the credit facilities of the government. The women farmers take a decisionin their own for small expenditure, but they would like to consult with their elder children or relatives prior to a big investment. All women farmers have a mobile phone and they use it for market information and to get advice from the local service providers.

Recently, there are a good number of women labors available to assist the farmers in their field activities. The women labors come mostly from the destitute and poor families. They work daily basis on average five hours per day. They work in all sphere of crop cultivation activities except land preparation and carrying products from fields to the household premises. Most of the farmers mentioned that women labors are sincere in their work. The compensation of women labor is less than the male labor because they could not do the same volume of works as a man labor. The average daily rate of women labor is 300-350 taka while the rate of male labor is 400-500 taka. For some value chains such as mung bean, payment to the women labor is in-kind (one fifth for first harvest and one-fourth in the second harvest).

Women role as an entrepreneur is not profound in the agricultural sector. There are hardly found a woman trader/ entrepreneur in the agricultural market. As like as women farmers, women become entrepreneurs/ traders due to the absence of her husband. They are involved in trading on a limited scale such as input retailing. Usually, women come to trade after performing the household activities.

The government of Bangladesh has emphasized the economic involvement of women in the agricultural sector. In the National Agricultural Technology Transfer Project (NATTP), a country-wide project of the government emphasized to include 35% of the beneficiaries from women. It has also set policy to include 30% of the trainees from women for training event if its duration is more than three days.

In crop sector especially brinjal, bitter gourd, tomato, sweet gourd, banana, aromatic rice, where women are participating most in Bangladesh especially during harvesting, postharvest management, drying, grading sorting and packaging. Women headed families have entire access to all activities both in production, postharvest management, and marketing.

Table 69: Contribution of Women in different VCs

Activities	brinjal,	bitter gourd,	Tomato	sweet gourd	banana	Rice
Crop Planning	M	M	H	M	M	L
Inputs selection	H	H	M	M	L	L
Land Preparation	L	L	L	L	L	L
Production	M	M	H	M	M	L
Intercultural operation	L	M	H	M	L	L
Harvesting	H	H	H	H	H	L
PHM	H	H	M	M	M	H
Storing	H	H	L	L	M	H
Transportation	L	L	L	L	L	L
Sales	L	L	L	L	L	L
Finance	M	M	M	H	M	L
Communication	M	M	L	L	L	L
Score	24	24	23	21	19	16
Rank	1	1	3	4	7	9

Note: High=3, Medium=2, Low=1; Highest Total=36

Table 70:**Gender Participation in Agricultural Value Chain**

	Crop Farming	Harvest	Post-harvest	Processing	Trade/ Marketing
Women Led	10%	30%	50%	50%	1%
Men Led	55%	40%	30%	10%	90%
Men-Women lead	35%	30%	20%	40%	9%
Source: Field Survey					

Table 71: **Gender Participation in Agricultural Value Chain**

	Crop Farming	Harvest	Post-harvest	Processing	Trade/ Marketing
Women Led	Low	Medium	High	High	Low
Men Led	High	Medium	Medium	Low	High
Men-Women lead	Medium	Medium	Medium	Medium	Low
Source: Field Survey					

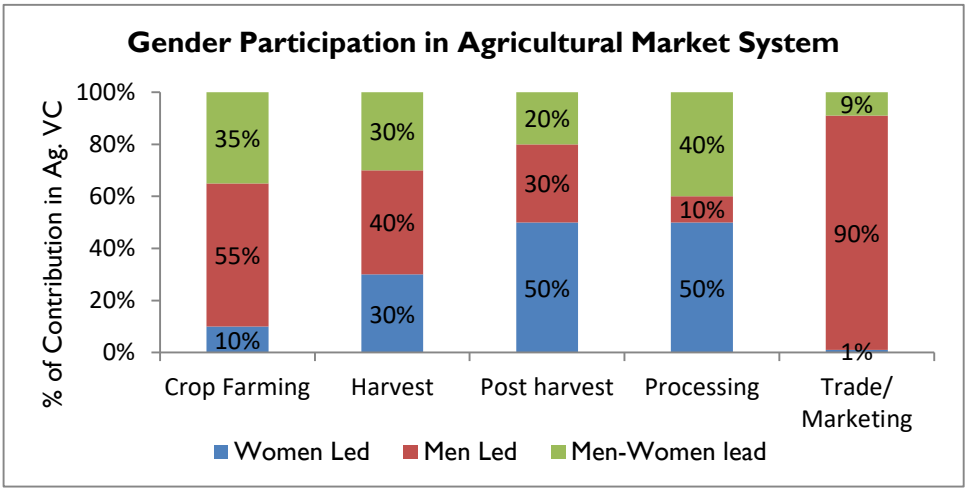


Figure 55: Gender Inclusiveness in market system

Table 72: Women Dimensions in the market				
Women Dimensions in the market	Criteria	Agriculture		
		High	Medium	Low
Sales	Decision			√
Market Information	ICT		√	
	Traders communication			√
	Others			√
Marketing place	At home			√
	To traders at market			√
	Other			√
Money	Own Custody (Self)		√	
	Freedom to Expenditure		√	
	Others			
Access to Finance	Credit		Y	

Women will require access to information, credit and other business development services in order to capitalize on the new market opportunities along changing or emerging value chains. Capacity building is required to ensure that women remain active and assure important positions in leadership and decision making in economic organizations. Special policies and provision are often required to ensure that women have control over important income generating activities:

- Developing women friendly technology and business environment;
- More women participation in market transaction;
- Capacity development of women for small-scale entrepreneurships;
- Collective action and market linkages;
- Supporting homestead agricultural value addition strategies;
- Recruit more women agricultural workers and increase their participation in the technology innovation;
- Protection of women and children from health hazards during agricultural operation.

Chapter IV: Constraints and commercial viable solution

4. Constraints in the Selected VC clusters along with value chain

Inadequate technical knowledge on scientific farming then use of poor quality of inputs remain in poor soil quality that increase production cost, lower yield and unsafe food for the consumers. Quality inputs such as seed, fertilizer and crop protection products are essential factors to improve vegetable, fruits and spices production especially for safe food concern, which is inadequate and application methods, timing, appropriateness are not maintained as per good agricultural practices. Most vegetable farmers are lack knowledge on better cultivation techniques, appropriate good quality inputs, poor cropping practices, poor post-harvest management, imbalance trade in output market, and informal relationship within the VC actors, to ensure optimum profitability. Lack of appropriate post-harvest management practices results in significant losses for farmers. Additionally, poor infrastructure at the farmers' market (no washing, cleaning, sorting and packaging facilities), absence of collection center made the value chain/supply chain weak and un-trusted relationship among the farmers, traders and consumers. No certification bodies are ensuring the product quality at par, and no crop specific GAP standards have been established yet. Inadequate post-harvest infrastructure facilities, huge wastages and low quality products, lower market price, lower volume of produces results less bargain power, minimum market information getting less price ultimately loss in commercial production. A recent study revealed that vegetables, highest postharvest losses from growers to consumers level was observed for brinjal (32.03%), tomato (31.09%), cabbage (24.94%) and cucumber (24.28%)[2]. Fruits and vegetables losses occur due to adoption of improper post-harvest practices at harvesting, sorting, grading, washing, handling, packaging, transporting, processing and preservation. Phytosanitary regulations appear to mandatory for export Total Quality Management, HACCP and GAP are necessary prerequisite for entry to many of the world's markets. Lack of those seems to be extensive violations in implementing procedure. Field staff in the Ministry of Agriculture Extension Service seems unaware of the hazards of chemical handling and poorly trained in chemical use and shortage of human resources. Simultaneously other value chain actors and fresh produce handler lack of knowledge on post-harvest management and huge labor turnover made the sector vulnerable especially for safe food concern.

[2] Assessment of Postharvest Losses and Improvement of Post-harvest Practices of Major Fruits and Vegetables of Bangladesh by Prof. Dr. M. Sekender Ali

Poor infrastructure at the farmer's market, absence of collection center made the value chain/supply chain weak and un-trusted relationship among the farmers, traders and consumers. No certification bodies are ensuring the product quality at par, and no crop specific GAP standards have been established yet. Inadequate post-harvest infrastructure facilities, huge wastages and low quality products, lower market price, lower volume of produces results less bargain power, minimum market information getting less price ultimately loss in commercial production.

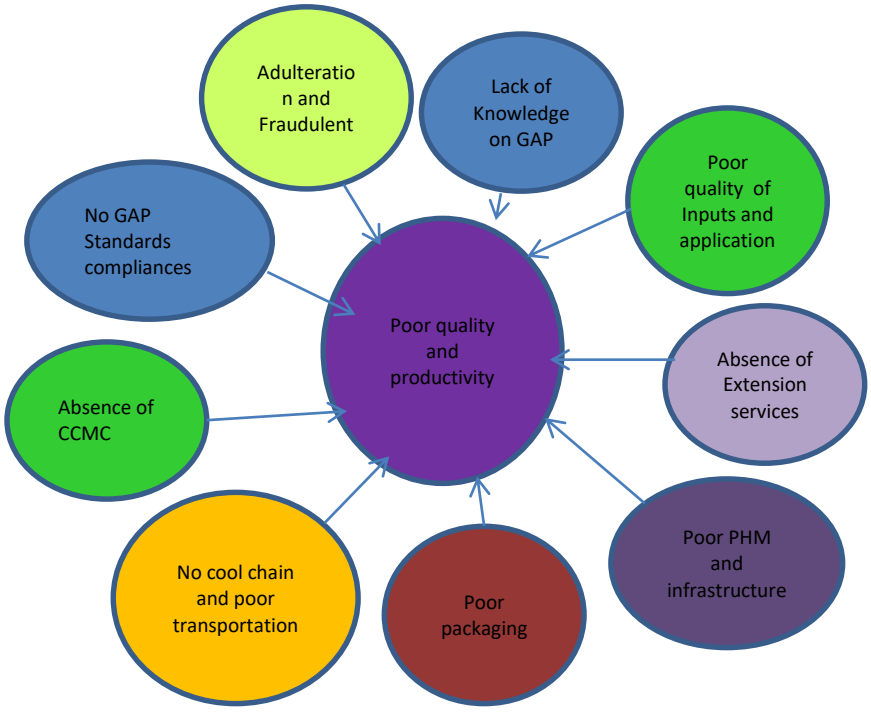


Figure 56: Value Chain Constraints

Constraints and commercially viable solutions/ intervention along with value chain

Table 73: Summary of Constraints and Opportunities in Bangladesh

Stage of VC	Constraints	Opportunities	Probable interventions
Pre-production	Absence of business oriented crop planning (business plan) for commercial vegetable (tomato) production	Pre-planning and effective supply chain management	Training and capacity building of the CIG/CCMC members on business planning as per market demand and contractors requirements
Inputs supply	Poor quality Inputs and its application Unavailability (and also timely delivery at retail point) of good quality inputs	High Demand of good quality inputs Agro-input Companies	Strengthen linkage between input suppliers and farmers with extension services Facilitate to improve distribution channel of reputed agro input companies Facilitate and linkage to get good quality commercial varieties of seed, good quality fertilizer, pesticides (linkage between CCMC and input supplying companies)
Production	Lack of knowledge on modern crop cultivation practices	Agro-Inputs companies	Facilitate CCMC, CIG and VC actors on capacity building and training on modern farming practices (GAP) through private sector enterprises
	Inadequate extension services	Modern Agricultural Practices Good quality of inputs, good farming practices	Facilitate and capacity building selected VC producers, and VC actors on GAP Facilitate and linkage building with agro inputs retailers, and output traders (supermarkets)

Table 73: Summary of Constraints and Opportunities in Bangladesh			
Stage of VC	**Constraints**	**Opportunities**	**Probable interventions**
			Strengthen linkages with DAE through CCMC and CIGs
	Pest infestation in high quality vegetable production	Agro-Inputs companies	Training on disease and pest management of CIG members and CCMCs (linkage between CCMC and input supplying companies)
Harvest and Post-Harvest	Poor knowledge and practices on harvesting and post-harvesting management results highwastage and lower income	Appropriate post-harvest management Processors, exporters and super shops involvement	Training and capacity building on post-harvest management of the CIG members/CCMCs through private sector enterprises (e.g. processors, exporters, super shops, large traders)
	Poor packaging and unavailability of packaging material (Plastic crates)	Proper packaging from farmers field to the end market	Facilitate and training of proper packaging and linkage with packaging materials providers
	Lack of processing industries in the study area to add value to the products	Value addition	Linkage with the processing industries for sales and marketing
	Inadequate cool chain management from farm field to the end market	Fresh vegetable fruits to the market at a premium price	Facilitate to raise awareness and capacity building on cool chain management Support CCMCs/CIG or enterprises with refrigerated / refer van for transportation and sales
Processing	Lack of modern machineries Product formula Poor transport facility	Low cost modern machineries Value addition Product diversification	Facilitate to form contract farming with processors, aggregators and processors Product diversification
Access to Market	Poor market infrastructure and inadequate space for local producers and post-harvest management activities		Market Infrastructures development with good governance through CCMC
	Lack of Market information	High market demand Export possibilities	Facilitate CCMC/CIGs to provide regular market information through ICT
	Absence of contract farming	Effective supply chain and trustworthy relationship	Facilitate to start formal contract farming with processors, large scale buyers and exporter
	No direct market linkage with market actors to get profitable price	Effective supply chain and trustworthy relationship	Facilitate linkage among the large scale traders, processors and supermarkets with CIG members and CCMCs
	Lack of fair price	Win-win business relationship	Facilitate to get appropriate market information through ICT and other buyers
Access to Finance	Lack of access to finance restricts targeted farmers to apply agro-inputs in appropriate time and quantity.	Processing companies Agro inputs companies Contract Farming	Facilitate to easy access to finance with MFI and Banks

Table 73: Summary of Constraints and Opportunities in Bangladesh			
Stage of VC	**Constraints**	**Opportunities**	**Probable interventions**
	Inadequate access to finance for traders and Post-harvest management	Financial transaction through financial institute	Facilitate and advocacy on access to loan for traders with financial institutes
	Absence of institutional financing in perishable product business for the VC actors	Intuitional financial business models and tools	Advocacy and linkage with the relevant financing institutes
Organization and management	Inadequate market monitoring system	Market information cell	Strengthen market monitoring system by DAM and Hortex together
	Weak CIG and CCMC coordination with market committees	Strengthen CCMC and CIGs	Facilitate to strengthen relationship trust, and connect with VC actors and market committees
	No formal contract among the VC actors	Effective supply chain through contract farming business model	Facilitate CCMC and CIG to form contract farming production system with Large scale VC actors with good relationship, contact, and trust
	Lack of relationship, trust, contract and contact among VC actors	Effective supply chain through contract farming business model	Facilitate to strengthen relationship trust, and connect with VC actors and market committees
Consumers	Lack of awareness on safe food gap in domestic market	Safe food demand	GAP Standards and branding
ICT	Limited availability of farmer friendly ICT tools and Channels Farmers' lack of knowledge about ICT tools and Channels	Tracking and use of ICT tools in production, marketing and sales	Facilitate to introduce ICT apps and tools
Infrastructure	Transportation cost is high	Proper packaging and transportation facilities through private sector enterprises	Facilitate to use cool van, and group transportation system by the CCMCs/CIGs
	No Cold Storage facilities	Cold storage business	Facilitate to establish multipurpose cold storages through private sector enterprises
	Insufficient space and equipment's for washing, sorting, grading etc.	Fresh and good quality product in the market	Facilitate to advocacy with the market committees to allocate more space in the market and widening CCMCs place together
Regulatory	Lack of product standard	Introduce compliances	Facilitate and Hortex can advocate for the selected product quality specifications
	No quality control and Quality assurance policy	Export of the selected products	Establish QA/QC cell in the DAE along with Hortex
	No quality certification agency	GAP certification by Hortex	GAP and other quality compliances certification system to be established

Risk Impacting Farmers and other actors during the strengthening of vegetable VC

Table 74: Risk Impacting Farmers and other actors during the strengthening of vegetable VC

RISK	Input Suppliers	Farmers	Buyers/ traders	Processors	Distributors
Weather Related Risks	Demand for inputs repayment for inputs on credit	Planting decisions Yield and quality, Income decline	Availability, price, quality of products Logistic costs	Availability, price, quality of products Logistic costs	Availability, price, quality of products logistic costs
Natural Disasters	Demand for inputs in this and subsequent year Repayment for inputs on credit	Yield and quality farm asset loss and income decline	Availability, price, quality of products logistic costs	Availability, price, quality of products Logistic costs	Availability, price, quality of products Logistic costs Cost to develop new supply sources
Market Related Risks	Demand for inputs Repayment for inputs on credit	Planting decisions Input use Yield and quality Income decline	Availability, price, quality of products	Availability, price, quality of products	Availability, price, quality of products
Logistics Related Risks	Demand for inputs in current and subsequent year (or season)	Input access and use yield and quality post-harvest losses Income decline	Availability, price, quality of products Availability and price of other products Operating costs	Availability, price, quality of products Availability and price of other products Operating costs	Availability, price, quality of products Availability and price of other products Operating costs
Management and Operational Risks	Demand for inputs in current and future years	Inappropriate planting decisions and input use reduced yield and quality	Availability, price, quality of products Operating costs Product rejections	Availability, price, quality,	Availability, price, quality of products Operating costs Loss of brand reputation

Chapter V: Recommendation and Value Chain Intervention

5. Value chain strengthening interventions

5.1 Value Chain Development

A '**value chain**' in **agriculture** identifies the set of actors and activities that bring a basic **agricultural** product from **production** in the field to final consumption, where at each stage **value** is added to the product.

A value chain is defined as organized linkages among groups of producers, traders, processors and service providers who join together to improve productivity and the value of the products. By joining together, the actors in the value chain increase competitiveness and are better able to maintain competitiveness through innovation. The limitations of each single actor are overcome by establishing synergies and governance rules aimed at producing higher value.

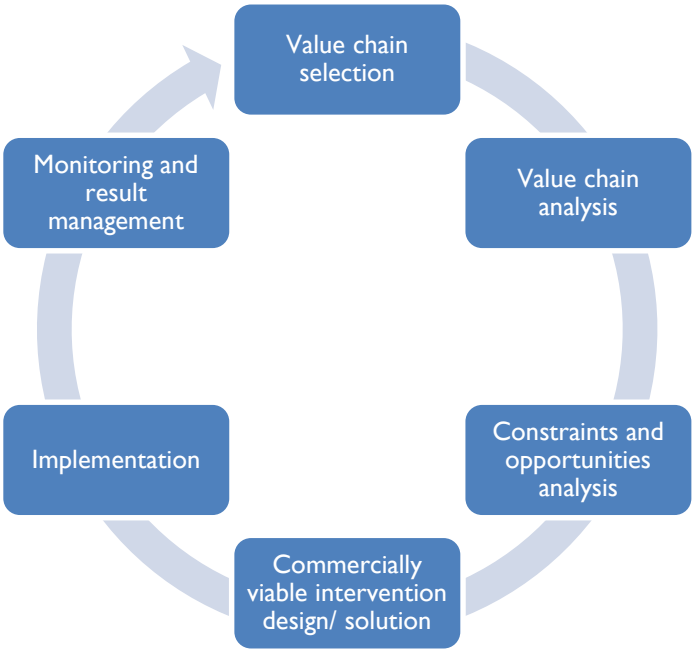


Figure 57: VC development Approach

In commercial agriculture, the supply chain focus is on producers and the competitive advantage is derived from processes that improve efficiency and reduce costs. By contrast an agriculture value chain involves a fundamental shift in focus from producers to consumers. The competitive advantage in value chains is derived from recognizing that it can create value in the eyes of the consumer and result in a backward and equitable flow of value. The premise for adopting a consumer driven value chain approach is that higher financial returns can be realized through value-enhancing inputs than can be obtained from simple supply chains.

In this project value addition will be derived from the production of safe food that meets established national and international health standards for consumption. The challenge therefore will be in establishing safe food value chains that are able to compete with existing supply chains that have evolved over time to become highly competitive and operate as uncoordinated spot market transactions. Changing current practices will be difficult and project interventions need to be focused on improving efficiencies that will increase profit margins while maintaining competitive prices.

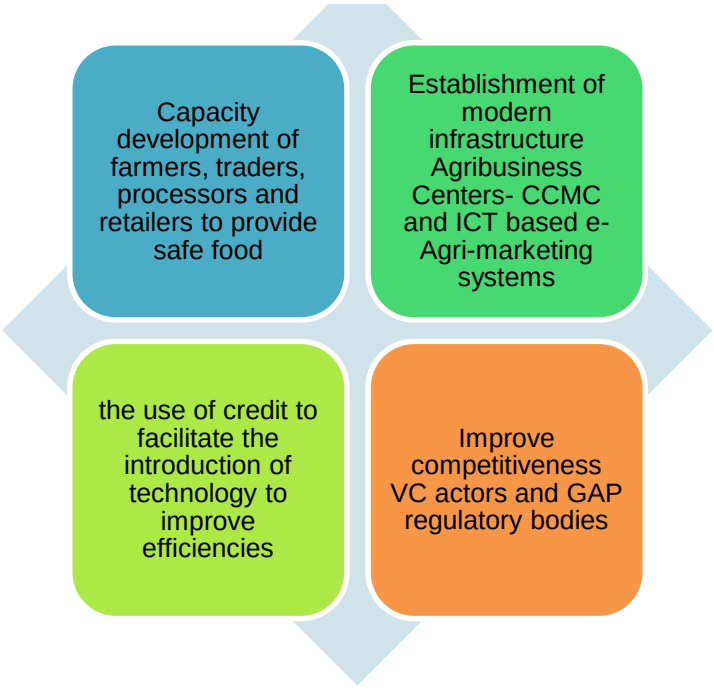


Figure 58: VC Strengthening Activities

Strengthening the value chain involve four areas of activity: (i) capacity development of farmers, traders, processors and retailers to provide safe food; (ii) the establishment of modern infrastructure CCMC (iii) the use of credit to facilitate the introduction of technology to improve efficiencies and (iv) Improve competitiveness VC actors and GAP regulatory bodies.

Training will largely have centered on the introduction of ~~modern~~ good agricultural practices (GAP), post-harvest management, agri-inputs linkages, market linkage across the value chain. Training will also involve building the capacity of traders and wholesalers to improve quality through grading and the use of packaging to reduce losses. Business management training for farmers and traders also required to improve their understanding of financial management and to evaluate which changes are likely to improve profit margins and efficiencies.

CCMC can be thought of as a "cluster" represents a collection of producers, traders or processors that are linked together horizontally and vertically to satisfy market demand for safe fresh produce products.

The introduction of ICT at this level would strengthen market linkages between major markets in Dhaka and traders operating out of collection centres.

Value chains are organized linkages between groups of producers, traders, processors, and service providers (including nongovernment organizations) that join together to improve productivity and the value added from their activities. By joining together, the participants in a value chain increase competitiveness and are better able to maintain competitiveness through establishment of CCMC.

5.2 Introduce Safe Food Value Chains in Fruits and Vegetables Sector in Bangladesh

Income of the citizen and urbanization has increased since few years that create demand for food diversity also changed from grain to other diets including fruits, and vegetables. Urban consumers, for example, prefer horticultural produce that is uniform in size and color and that is attractively presented in unitized packing. Consumer demands define the quality of production inputs as well as production, post-harvest and distribution practices. Thus, by delivering value to its customer, each supply chain partner effectively delivers value to the final consumer.

Quality and adulteration awareness becoming concerns of the food value chain. Different food safety acts are in place. The gap between farm prices and consumer prices is widening because more affluent and discerning consumers require an increasing number of services and attributes to agricultural products. This offers potential opportunities for farmers, other VC actors to capture higher prices if they are able to engage in value-adding activities and effective post-harvest management and provide safe food to the consumer.

The success or failure of a horticultural supply chain is ultimately determined by the degree to which produce satisfies consumer requirements for quality and safety. It is these preferences of consumers that drive modern horticultural supply chains. Consumer demands define the quality of production inputs as well as production, post-harvest and distribution practices. Information flow up and down the chain is, therefore, a crucial element in meeting consumer requirements. Each participant in the chain requires its upstream producer to supply produce that will allow it to meet the requirements of the downstream customer. This is applied until the end of the chain, where retailer provides produce that satisfies consumer requirements. Thus, by delivering value to its customer, each supply chain partner effectively delivers value to the final consumer.

5.3 E-Platform for business transaction

An electronic platform may established to improve communications and transactions between value chain actors. The electronic platform will operate at two levels:

(i) As an e-forum that facilitates information flow between extension agents / farmers, input suppliers / farmers and farmers / farmers. E-forums will be established to serve the profile of collection centre

(CCMC) communities and may vary depending on what crops are grown and differences in cultivation practices. Collection centres to be responsible for maintaining the e-forum.

(ii) As an e-market between wholesalers – traders and traders / farmers. It is anticipated that in the first phase of the project e-marketing will be confined to transactions between wholesalers – traders and may take the form of an auction system between traders and wholesalers and wholesalers and retailers. An E – marketing system provides real-time market information between the retailers / wholesalers and traders and spin off benefits of this include: (i) improvement in competitiveness and efficiency in agricultural markets, (ii) elimination of traders' cartels and price manipulations by local trading groups, and (iii) lower price spread between producers and consumers (iv) better match between supply and demand. Collection and distribution centres (CCMC) will be responsible for maintaining the e-marketing platform

(iii) **Farmers SMART Card:** A details SMART card with GIS support (RFID) system to be introduced with details profile of farmer, including bank account, farming database, traceability, business transactions (payments), and registered with other relevant organization.

5.4 Summary of recommendation

Value Chain development project to be designed to provide marketing services to marginal and small farmers identified as beneficiaries under different VCs. The pattern of activities designed and performed is similar to all VCs. Following recommendations to be made for the development of value chain project.

Table 75: Priority of recommendation against constraint

Stage of VC	Constraints	Recommendations	Priority
Pre-production	Absence of business oriented crop planning (business plan) for commercial vegetable (tomato) production	• Training and capacity building of the CIG/CCMC members on business planning as per market demand and contractors requirements	Low
Inputs supply	Poor quality Inputs and its application Unavailability (and also timely delivery at retail point) of good quality inputs	• Strengthen linkage between input suppliers and farmers with extension services through CCMC and private enterprises	High
Production	Lack of knowledge on modern crop cultivation practices	• Facilitate CCMC, CIG and VC actors on capacity building and training on modern farming practices (GAP) through private sector enterprises	High
	Inadequate extension services	• Facilitate and capacity building selected VC producers, and VC actors on GAP • Facilitate and linkage building with agro inputs retailers, and output traders (supermarkets) • Strengthen linkages with DAE through CCMC and CIGs	Medium
	Pest infestation in high quality vegetable production	• Training on disease and pest management of CIG members and CCMCs (linkage between CCMC and input supplying companies)	High
Harvest and Post-Harvest	Poor knowledge and practices on harvesting and post-harvesting management results high wastage and lower income	• Training and capacity building on post-harvest management of the CIG members/CCMCs through private sector enterprises (e.g. processors, exporters, super shops, large traders)	High
	Poor packaging and unavailability of packaging material (Plastic crates)	• Facilitate and training of proper packaging and linkage with packaging materials providers	Medium
	Lack of processing industries in the study area to add value to the products	• Linkage with the processing industries for sales and marketing	Low

Table 75: Priority of recommendation against constraint			
Stage of VC	**Constraints**	**Recommendations**	**Priority**
	Inadequate cool chain management from farm field to the end market	• Facilitate to raise awareness and capacity building on cool chain management • Support CCMCs/CIG or enterprises with refrigerated / refer van for transportation and sales	Low
Processing	Lack of modern machineries Product formula Poor transport facility	• Facilitate to form contract farming with processors, aggregators and processors • Product diversification	Low
Access to Market	Poor market infrastructure and inadequate space for local producers and post-harvest management activities	• Market Infrastructures development with good governance through CCMC	Medium
	Lack of Market information	• Facilitate CCMC/CIGs to provide regular market information through ICT	High
	Absence of contract farming	• Facilitate to start formal contract farming with processors, large scale buyers and exporter	Medium
	No direct market linkage with market actors to get profitable price	• Facilitate linkage among the large scale traders, processors and supermarkets with CIG members and CCMCs	High
	Lack of fair price	• Facilitate to get appropriate market information through ICT and other buyers	High
Access to Finance	Lack of access to finance restricts targeted farmers to apply agro-inputs in appropriate time and quantity.	• Facilitate to easy access to finance with MFI and Banks	Medium
	Inadequate access to finance for traders and Post-harvest management	• Facilitate and advocacy on access to loan for traders with financial institutes	Medium
	Absence of institutional financing in perishable product business for the VC actors	• Advocacy and linkage with the relevant financing institutes	Low
Organization and management	Inadequate market monitoring system	• Strengthen market monitoring system by DAM and Hortex together	Medium
	Weak CIG and CCMC coordination with market committees	• Facilitate to strengthen relationship trust, and connect with VC actors and market committees	Medium
	No formal contract among the VC actors	• Facilitate CCMC and CIG to form contract farming production system with Large scale VC actors with good relationship, contact, and trust	Medium
	Lack of relationship, trust, contract and contact among VC actors	• Facilitate to strengthen relationship trust, and connect with VC actors and market committees	Medium
Consumers	Lack of awareness on safe food in domestic market	• GAP Standards and branding	Low
ICT	Limited availability of farmer friendly ICT tools and Channels Farmers' lack of knowledge about ICT tools and Channels	• Facilitate to introduce ICT apps and tools	Medium
Infrastructure	Transportation cost is high	• Facilitate to use cool van, and group transportation system by the CCMCs/CIGs	Medium
	No Cold Storage facilities	• Facilitate to establish multipurpose cold storages through private sector enterprises	Medium
	Insufficient space and equipment's for washing,	• Facilitate to advocacy with the market committees to allocate more space in the market and widening CCMCs place together	Medium

Table 75: Priority of recommendation against constraint			
Stage of VC	**Constraints**	**Recommendations**	**Priority**
	sorting, grading etc. in the market		
Regulatory	Lack of product standard	• Facilitate and Hortex can advocate for the selected product quality specifications	High
	No quality control and Quality assurance policy	• Establish QA/QC cell in the DAE along with Hortex	Low
	No quality certification agency	• GAP and other quality compliances certification system to be established	Low

Chapter VI: Conclusion

6. Conclusion

The VC analysis and mapping survey both covered quantitative and qualitative processes to accurate analytical finding of the field information in selected 30 locations/cluster in 6 value chains.

Commercially sustainable agriculture can benefit from a mix of value chain and market system development approaches (a mixed approach that adopts the most appropriate elements of each). This can help attain higher yields, increase farms profits, and create win-win business relationships for VC actors without undermining the resource conservation on which the agricultural system depends. The mixed approach will explore connections between farming, trading, policy issues, business-enabling environment, and other aspects of the social, economic, and ecological environment to identify critical current constraints for attention.

The Government of Bangladesh has already developed a protocol to develop Good Agricultural Practices (GAP) in a few crops, establishing that as a major priority of the new Agricultural Policy. The policy also calls for development and implementation of protocols for codes, standards and regulations to fulfil trade and food safety and quality requirements. It incorporates the four pillars of GAP: economic viability, environmental sustainability, social acceptability, and food safety and quality. Transfer of technologies and diversification and intensification of crop production through appropriate extension services are also crucial.

Along with DAE regular activities CCMC and facilitate on farmers' market linkage, capacity building of the local farmers, traders in a common platform. In CCMC's all the VC actors able to provide services embedded with their products, also occasional farmer field visits, arrange field days (supporting by the companies that supply their inputs), and distribute promotional materials. CCMC would be the common place where all the VC actors come together and share their views. Hence CCMC can provide machineries rental services, business transactions, and support services as per need of the farmers. Commercial viability driven interventions may undertake through CCMC and CIGS along with private sectors enterprises to enhance desired impact on the economic empowerment of all value chain actors. This will emphasis on VC relationship, trust building and longtime business.

Annexure I: Questionnaire for the Study

Value Chain Study in 30 upazilas

National Agricultural Technology Program – Phase II Project (NATP-2)

Hortex Foundation, Bangladesh

Questionnaire for Farmers

Name of CIG :
Village :
Name of UNION:
Name of Upazila :
Name of District :

1	Name of Farmer, with Mobile No. if any:					
1-2	What is your age, education? Age (yrs.), Education (No. of classed passed)					
3-6	Number of Family Member?					
	Total	**Male**	**Female**	**Working**	**student**	**child**
4-7	What is the area of land (Acre) of your family?' :					
	Owned Land	**Leased in Land**	**Leased out**	**Total area cultivated**		
8	How much area of (tick only one) Brinjal/ Bitter Gourd/Sweet Gourd/Banana/Aromatic Rice did you cultivate in 2018 in Acre?				Acre/Dec	
9	What was the total production?			Mond/Kg		
10	What was the cost and revenue earned? (Fill-up the attached sheet)?					
11-17	Whom did you sell the product and where? (Commodity specific)					
	Whom	**Amount (kg)**	**Price: Tk./Kg**	**Where [1] (F/H/M)**	**Cost of sales [2] (Tk)**	
	Home consumption					
	Sell to Foria					
	Sell to Aratdar					
	Sell to Retailer					
	Sell to Supplier					
	Sell to processor					
	Sell to exporters					
	Total/Av					
	[1] F=Farm, H=Home, M= Market [2] Cost of labour, freight. rent, levy, market tax/commission, loading unloading, etc.					
18	What the volume is of a **LOT** generally you Harvest/Sell in day on an average?			Ton/Mond/ Kg		
19-20	Which of the following did you perform at what cost/labour before sale?					
	Activities	**No of labour engaged**		**Total Cost (Tk.)**		
	Inputs application					
	Production					
	Special care					
	Harvesting					
	Pre-cooling					
	Washing (when needed)					
	Sorting					
	Grading					
	Treatment					
	Drying					
	Packaging					
	Transporting					
21-24	How are you linked with the Value Chain Actors?					

	Value Chain Actors	How Frequently contact with[1]	What kind of contract with[2]	What depth of relation with[3]	Level of trust[4]
1	Import & Export Policy				
2	Quarantine				
3	Freight policy				
4	Market Management Committee				
5	Licensing/Taxes				
6	Quality Control				
7	Farmer				
8	Foria/ Paikers				
9	Aratdars				
10	Suppliers				
11	Wholesalers				
12	Local Retailers				
13	Supermarkets				
14	Exporters				
15	Processors				
16	Consumers				
17	Seeds dealer/Shops				
18	Fertilizer dealer/Shop				
19	Pesticide dealer/Shop				
20	Power Tillers Owners				
21	Pumps Owners				
22	DAE (SAAO/UAO)				
23	BARI (Scientists)				
24	BADC (Seed)				
25	LBF				
26	PO				
27	MMC				
28	Labours contracting Groups				
29	NGOs				
30	Banks				
31	Transport Owners				
32	Mohajans				

[1]Always=7, Once in a day=6, Once in a week=5, Once in a fortnight=4, Once in a month=3, Once in a quarter=2, Once in a year=1, No contact=0
[2]No Contract=0, Verbal Contract=1, Written Contract=2, MOU/Deed=3
[3]Depth of Relationship: 0-5 (No, Very little, Little, Substantial, High, very High)
[4]Lovel of trust: 0-5 (No, Very little, Little, Substantial, High, very High)

What new technologies/practices of production/marketing/processing did you learn from Hortex/DAE's NATP project?

1.
2.
3.
4.
5.

What problems/ difficulties are you facing to produce and market of **Brinjal/ Tomato/ Bitter Gourd/ Sweet Gourd/ Banana/Aromatic Rice (tick one)**

Production Problem/ difficulty	Post-harvest management	Marketing Problem/ difficulty	Others
1		1	
2		2	
3		3	
4		4	
5		5	

What support do you need to increase production and quality of products (Brinjal/ Bitter Gourd/Sweet Gourd/Banana/Aromatic Rice) from Hortex/NATP Project?

Inputs

	Production
	Post-harvest
	Transportation
	Marketing
	Finance

Any Suggestions:

Value Chain Study in 30 upazilas

National Agricultural Technology Program – Phase II Project (NATP-2)

Hortex Foundation, Bangladesh

Questionnaire for Market Actors

(Forias/ Paikers/ Aratdars/ Suppliers/ Wholesalers/ Retailers/ Supermarkets)

Name of Target Market :
Village :
Name of UNION :
Name of Upazila :
Name of District :

Tick the Product: Brinjal/ Tomato/Bitter Gourd/Sweet Gourd/Banana/Aromatic Rice

1	**Name and Contact No. of the Proprietor?**					
2-3	What is your age, education? Age (yrs.), Education (No. of classed passed)					
4-9	Number of Family Member?					
	Total	Male	Female	Working	student	child
10	What business are you engaged? Give tick mark					
	Forias/ Paikers/ Aratdars/ Suppliers/ Wholesalers/ Retailers/ Supermarkets					
11	What are the products you buy and sell?					
	Products:					
12	What other business are you involved?					
	Other Business:					
13	Approximately, what is your annual sales from business of targeted product?					
	Tk.					
14	What is your total Annual income for all businesses?					
	Tk.					
15	Do you have a trade licenses?					
	Name: Date (Yrs) Authority?					
16-22	From whom did you sell the product and where?					
	Whom	Amount (kg)	Price: Tk./Kg	Where (F/H/M)	Cost of sales (Tk)	
	From Farmer					
	From Foria					
	From Aratder					
	From Retailer					
	From Supplier					
	From processor					
	From Exporters					
	Total/Av					

23-27	Whom did you sell the product and where?				
	Whom	**Amount (kg)**	**Price: Tk./Kg**	**Where (F/H/M)[1]**	**Cost of sales (Tk)[2]**
	Home consumption				
	Sell to Foria				
	Sell to Aratdar				
	Sell to Retailer				
	Sell to Supplier				
	Sell to processor				
	Total/Av				
	[1] F=Farm, H=Home, M= Market [2] Cost of labour, freight. rent, levy, market tax, loading unloading, etc				
28	What the volume is of a LOT generally you buy/sell in day on an average?		Ton/Mond/Kg.		

29-30	Which of the following did you perform at what cost/labour?		
	Activities	**No of labour engaged**	**Total Cost (Tk.)**
	Pre-cooling		
	Washing (when needed)		
	Sorting		
	Grading		
	Treatment		
	Drying		
	Packaging		
	Transporting		

31-35	How are you linked with the Value Chain Actors?				
	Value Chain Actors	How Frequently contact with[1]	What kind of contract with[2]	What depth of relation with[3]	Level of trust[4]
1	Import & Export Policy				
2	Quarantine				
3	Freight policy				
4	Market Management Committee				
5	Licensing/Taxes				
6	Quality Control				
7	Farmer				
8	Foria/ Paikers				
9	Aratdars				
10	Suppliers				
11	Wholesalers				
12	Local Retailers				
13	Supermarkets				
14	Exporters				
15	Processors				
16	Consumers				
17	Seeds dealer/Shops				
18	Fertilizer dealer/Shop				
19	Pesticide dealer/Shop				
20	Power Tillers Owners				
21	Pumps Owners				
22	DAE (SAAO/UAO)				
23	BARI (Scientists)				
24	BADC (Seed)				
25	LBF				
26	PO				
27	MMC				
28	Labours contracting Groups				
29	NGOs				
30	Banks				
31	Transport Owners				
32	Mohajans				
	[1]Always=7, Once in a day=6, Once in a week=5, Once in a fortnight=4, Once in a month=3, Once in a quarter=2, Once in a year=1, No contact=0 [2]No Contract=0, Verbal Contract=1, Written Contract=2, MOU/Deed=3 [3]Depth of Relationship: 0-5 (No, Very little, Little, Substantial, High, very High) [4]Lovel of trust: 0-5 (No, Very little, Little, Substantial, High, very High)				

36	What new technologies/practices of marketing/processing did you learn from Hortex/DAE's NATP project?
	1
	2

	3			
	4			
37	What problems/difficulties are you facing to produce and marketing of **Brinjal/ Bitter Gourd/Sweet Gourd/Banana/Aromatic Rice (tick one)**			
	Production problems/difficulties	Post-Harvest Management	Marketing problems/difficulties	Transportation
	1		1	
	2		2	
	3		3	
	4		4	
38	What support do you need from Hortex/DAE/NATP project to increase quality of products and Marketing (**Brinjal/ Bitter Gourd/Sweet Gourd/Banana/Aromatic Rice)**			
	Inputs			
	Production			
	Post-harvest			
	Transportation			
	Marketing			
	Finance			

Any Suggestions

Value Chain Study in 30 upazilas
National Agricultural Technology Program – Phase II Project (NATP-2)
Hortex Foundation, Bangladesh

Questionnaire for Consumers of Targeted Product (Brinjal/Tomato/Bitter Gourd/Sweet Gourd/Banana/Aromatic Rice)

	Name of Consumer with Mobile No. if any:					
	What is your age, education? **Age** (yrs.), **Education** (No. of classed passed)					
	Number of Family Members?					
	Total	**Male**	**Female**	**Working**	**student**	**child**

	Among the following products how do you prefer to eat?				
	Product	**Level of preference**			
		No	**Little**	**Much**	**Very much**
	Brinjal				
	Tomato				
	Bitter Gourd				
	Sweet Gourd				
	Banana				
	Aromatic Rice				

	How much did you buy in a week at what price?				
	Product	**Bought at price/Kg or dozen**			
		Amount (Kg.)			**Price Max-Mn/Kg or D**
		2018	**2017**	**2016**	
	Brinjal				
	Tomato				
	Bitter Gourd				
	Sweet Gourd				
	Banana				
	Sagar(dozen)				
	Chinichampa(dozen)				
	Aromatic Rice				
	Do you have refrigerator at home? Yes / No				

31-35 How are you linked with the Value Chain Actors?

	Value Chain Actors	**How Frequently contact with[1]**	**What kind of contract with[2]**	**What depth of relation with[3]**	**Level of trust[4]**
1	Import & Export Policy				
2	Quarantine				
3	Freight policy				
4	Market Management Committee				
5	Licensing/Taxes				
6	Quality Control				
7	Farmer				
8	Foria/ Paikers				
9	Aratdars				
10	Suppliers				
11	Wholesalers				
12	Local Retailers				
13	Supermarkets				
14	Exporters				
15	Processors				
16	Consumers				
17	Seeds dealer/Shops				
18	Fertilizer dealer/Shop				
19	Pesticide dealer/Shop				
20	Power Tillers Owners				

21	Pumps Owners				
22	DAE (SAAO/UAO)				
23	BARI (Scientists)				
24	BADC (Seed)				
25	LBF				
26	PO				
27	MMC				
28	Labours contracting Groups				
29	NGOs				
30	Banks				
31	Transport Owners				
32	Mohajans				
	[1]Always=7, Once in a day=6, Once in a week=5, Once in a fortnight=4, Once in a month=3, Once in a quarter=2, Once in a year=1, No contact=0 [2]No Contract=0, Verbal Contract=1, Written Contract=2, MOU/Deed=3 [3]Depth of Relationship: 0-5 (No, Very little, Little, Substantial, High, very High) [4]Lovel of trust: 0-5 (No, Very little, Little, Substantial, High, very High)				
36	What new technologies/practices of preservation/processing did you learn from Hortex/DAE's NATP project?				
	1				
	2				
	3				
	4				
37	What problems/difficulties are you facing to preservation and consumption of **Brinjal/ Bitter Gourd/ Sweet Gourd/Banana/Aromatic Rice (tick one)**				
	Preservation problems/difficulties	Consumption problems/difficulties			
	1	1			
	2	2			
	3	3			
38	What support do you expect from Hortex/DAE/NATP project to increase quality of products and **safe consumption** of Brinjal/ Bitter Gourd/Sweet Gourd/Banana/Aromatic Rice				

Any Suggestions:

Annexure II: ToR of the Study

Terms of Reference (ToR)
Value Chain Analysis of high value crops (vertical expansion) in 30 clusters
National Agricultural Technology Program – Phase II Project (NATP-2),
Hortex Foundation, Bangladesh

Rationale

Development of Value chain in Crop/Horticulture is a five-year initiative under NATP-2 funded by the IDA-World Bank, IFAD and GOB, and implemented by partnership between DAE and Hortex Foundation with the development objective is to increase the agricultural productivity of smallholder farms and improve smallholders access to markets in selected districts.

As per DDP for NATP-2 (Page-406), Hortex Foundation would like to organize value chain analysis of high value crops in 30 clusters (Table-1) through recruiting a short term consultant. The analysis will look at the range of complex activities undertaken by farmers, traders, processors, service providers of selected commodities produced within the project sites.

Table 1: **NATP-2 Value Chain Cluster upazilas for selected commodities (vertical expansion)**

Brinjal-6 clusters	**Bitter Gourd – 5 clusters**	**Tomato-6 clusters**		**Sweet Gourd-5 clusters**	**Banana – 5 clusters**	**Aromatic Rice-3 clusters**
		Winter	**Summer**			
1.Raipura, Narshingdi	1.Kaligonj, Jhenaidha	1.Chandina, Comilla	5.Bagherpara, Jessore	1.Sadar, Bogra	1.Shibgonj, Bogra	1.Birgonj, Dinajpur
2.Shibpur, Narshingdi	2.Modhupur, Tangail	2.South Surma, Sylhet	6.Jhikorgacha, Jessore	2.Boraigram, Natore	2.Polash Bari, Gaibanda	2.Chirirbondar, Dinajpur
3.Sadar, Jessore	3.Belabo, Narshingdi	3.Mirrersorai, Chittagong		3.Delduar, Tangail	3.Kapasia, Gazipur	3.Nakla, Sherpur
4. Islampur, Jamalpur	4.Sadar, Naogaon	4.Godagari, Rajshahi		4.Sadar, Kishoreganj	4.Sadar, Khagrachari	
5.Sreemongal, Moulovibazar	5.Mithapukur, Rangpur			5.Savar, Dhaka	5. Muktagacha, Mymensingh	
6.Parbatipur, Dinajpur						

Analysis Objectives
The primary objective of the intended assignment therefore, is to conduct a Value Chain Analysis of selected high value crops in the value chain cluster upazilas as mentioned in **Table 1.** The data and information generated from the analysis will help Hortex Foundation and PIU-DAE to determine key issues hindering selected commodities growth and competitiveness.

The specific objectives are:

1. To come up with a ‘’value chain map’ ’for each of the six selected commodities that graphically presents all the relevant actors (farmer, relevant public and private sector actors - traders engaged in domestic and export markets, agro-processors,) and their depth of relationship with one another;

2. To identify existing major production and marketing practices, production amount in ton of the designated clusters, market demand in terms of quantity and quality;

3. Based on the initial findings, identify main constrains throughout the value chains. These can be grouped in the following categories:

    - ✓ Technological related to crops production/product development,
    - ✓ market access,
    - ✓ agro-input supply,
    - ✓ organization and management,
    - ✓ finance,
    - ✓ infrastructure,
    - ✓ regulatory (Policy) & quality control.

4. Identify specific interventions to assist actors in the value chains to address constraints with due consideration to the themes on value addition from farm to fork, market linkages and sustainability.

5. To present and validate the findings of value chains analysis in a national workshop, and also facilitate the design of value chain development interventions along with actors who to be partnered in the upazila wise value chain development program.

Analysis Methodology

The consultant will use a methodology considered technically sound and most appropriate to achieve the objectives outlined above. The methodology will be presented and agreed with concerned team members of Hortex Foundation. The methodology should reflect the existing information sources, the need to collect additional information as well as the specific interventions. The study methodology should consist of both quantitative (questionnaire) and qualitative (Participatory tools) methods for data/information collection and, particularly interviews/discuss with CIGs farmers, agro-inputs and outputs traders, extension service providers, agro-processors. Hortex Foundation will provide background information necessary for samplings design of the analysis. The whole analysis accomplishment process will have to ensure the following steps:

1. Review relevant project documents and other documents for conducting value chains analysis and reporting;
2. Develop value chains assessment methodology and samplings procedures required for the analysis in consultation with value chain program management;
3. Develop tools for discussion and interviews (i.e. FGD, KII) with CIGs farmers and ‘’key informants’’ incorporating appropriate questions/checklists for information items;
4. Translation of study tools in local language i.e., Bengali as necessary;
5. Ensure participation of officer, Local Business Facilitator, consultants from Hortex Foundation and DAE in all field analysis largely as observers;
6. Pre-test tools under field conditions and update the same with appropriate questions;
7. Finalize the sample size in consultation with program management;
8. Collect data and information using finalized tools from planned primary and secondary sources;
9. Write report using error free data, study observations, findings (constraints, interventions,) and present in a national workshop;
10. Finalize report after incorporating feedback from participants in national workshop, concerned technical team members of the Hortex Foundation;
11. Submit the final report (a set of three copies) to the value chain development program management, NATP-2, Hortex Foundation for final approval accompanied by a soft copy/CD of report.

Deliverable

The expected deliverables are:

1. An inception report outlining the methodology for value chain analysis of high value crops in 30 upazilas, work plan for the assessment, an outline of field work and consultation with project team members within 1st week of signing the contract and before commencement of field work.
2. Draft assessment report (Executive summary, methodology, description of findings of the value chain analysis, and solutions/recommendations on how best the project can support the CIGs/PO on market oriented value chain development of selected high value crops in 30 upazilas).
3. Power point presentation of major findings in a national workshop, date and time to be determined in consultation with project key stakeholders.
4. Final report incorporating recommendations by the Hortex Foundation and DAE technical teams within 1 week after the power point presentation to the team.

The deliverables must be accepted by Hortex Foundation management prior to final payment.

The Short term Consultant for conducting Value Chains Analysis

A short term Consultant will be recruited who will develop value chains methodology, conduct value chains analysis of six selected high value crops/horticulture as mentioned earlier, report preparation and presentation, finally submit the report.

Required Qualification and Experiences

The consultant must demonstrate full competence in conducting value chain analysis of high value crops with relevant qualification and experience. Specifically, the Consultant should:

1. Minimum Master Degree in Agricultural Science with minimum 10 years' experience in the field of agriculture development, research and market development.
2. Minimum 3 years work experience e in agriculture commodities value chain analysis, crop sub-sector analysis, report writing, presentation in donor/IDA World Bank funded agricultural development projects.
3. Demonstrate the ability communicate and build relationships with value chain actors and organizations to gather in-depth information.
4. Demonstrate diverse understanding and clear knowledge of value chain analysis preferably with high value horticultural crops.
5. Demonstrate familiarity with value chain assessment methodologies, relevant source of information, and key persons to consult.
6. Have excellent analytical, writing and reporting skills.
7. Computer literacy skills in MS Word, Excel, and Power Point.

Duration of the assignment:

The expected duration of the assignment is 3 months from Ist of April, 2018.

Duty Station

Hortex Foundation, Sech Bhaban (3rd floor), 22, Manik Mia Avenue, Dhaka and project areas.

Selection Procedures

The Consultant will be selected using PPR 2008 and selection of short term consultant as per World Bank Guidelines. The applicants are requested to submit Curriculum Vitae (CV) in the prescribed format as EOI, one recent passport photograph and expected remuneration. The format can be obtained from the office of the undersigned.

Remuneration: Negotiable as per DPP provision.

Last date of submission: ----------

Place of submission: Office of the Hortex Foundation, Sech Bhaban (3rd floor), 22, Manik Mia Avenue, Dhaka-1207.

The authority reserves the right to accept or reject any or all EOIs.