



An Analytical Study on Value Chain Financing to High-Value Agriculture in Eastern Uttar Pradesh

Shri Durga Ji Post Graduate College

आर्थिक विश्लेषण एवं अनुसंधान विभाग

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**An Analytical Study on Value Chain Financing to
High-Value Agriculture in Eastern Uttar Pradesh**

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About NABARD Research Study Series

The NABARD Research Study Series has been started to enable wider dissemination of research conducted/sponsored by NABARD on the thrust areas of Agriculture and Rural Development among researchers and stakeholders. The study titled '*An Analytical Study on Value Chain Financing to High-Value Agriculture in Eastern Uttar Pradesh*' completed by Shri Durgaji Post Graduate College is the thirty third in the series. The list of studies in the series is given at the end of this report.

A value chain is characterised by a market-focussed collaboration of a set of enterprises working together to produce, process and market products and services in an effective and efficient manner. The set of actors conduct a linked sequence of activities and act in an inter-dependent complimentary way within the value-chain. A well-functioning agri. value-chain integrates small holder farmers with other key actors and higher order processes. This facilitates access to quality farm inputs, technology, quality standards, hassle free credit, access to processing and market link, etc.

Uttar Pradesh ranks first in the country's total mango production and third in total inland fish production. It contributes more than 4 per cent towards country's total tomato production. Despite significant production, the value chain of these commodities is fragmented due to lack of cohesion, widening gap between supply and demand, missing critical links between farms and markets. This study examines the analytical views of fragmented and integrated value chains of fish, tomato and mango as a component of high value agriculture thus throwing some light on the pattern and access to finance, assessing the constraints faced by the value chain actors.

Hope this report would make a good reading and help generate debate on issues of policy relevance. Let us know your feedback.

Dr. K C Badatya
Chief General Manager
Department of Economic Analysis and Research

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EXECUTIVE SUMMARY

The public policies are geared towards diversification to high-value agriculture — fruits, vegetables, dairy, poultry, fishery etc. — which can generate higher incomes on small farms by establishing shorter value chains and linking farmers to markets. The value chain finance offers an opportunity to expand financing for agriculture, improve efficiency and repayments in financing, and to strengthen or consolidate linkages among participants in value chains. A value chain, thus, can be an entry point for financial institutions to improve their outreach to chain actors.

The present study was examined the analytical views of fragmented and integrated value chains of the fish, tomato and mango as a component of high value agriculture. The study was thrown light in respect of the pattern and level of access of the finance in the value chains of high value agriculture, and also assessed the constraints faced by value chain actors that limit their financial opportunities.

The study is based on extensive field survey and interaction with farmers and value chain actors in the district Azamgarh for fish, Jaunpur for tomato and Varanasi for mango during 2021-2022. The primary data were collected from the farmers/growers and value chain actors using pre-tested interview schedule.

A multi-stage purposive-cum-stratified random sampling design was adopted to select study areas and respondents. The study was comprised a total 300 farmers from 30 villages of 06 blocks of all three districts namely Varanasi, Jaunpur and Azamgarh. The farmers of various category *viz.*, small & marginal farmers (< 1ha.), medium farmers (1-2 ha) and large farmers (> 2 ha), were selected in order of their proportion in the sample population of the respective villages. Moreover, total of 144 value chain actors from the markets of the districts were taken as a respondent. Hence, the study was administrated to the sample of 444 respondents.

- The average cost of cultivation for different categories of farms was estimated and found that the average operating cost for cultivation of fish was ₹ 132500, ₹ 132500 and ₹ 259060 per acre for marginal and small, medium and large fish farms. Feed cost and fingerlings costs were the most important costs for all three categories of the fish farms (marginal and small, medium and large fish farms).
- The average operating cost for cultivation of tomato was ₹ 27704, ₹ 34111 and ₹ 3802 per acre for marginal and small, medium and large tomato farms.

Labour charges and manure & fertiliser were the most important costs for all three categories of the tomato farms.

- The average operating cost for cultivation of mango was ₹ 45989, ₹ 58275 and ₹ 72620 per acre for marginal and small, medium and large mango growers, respectively. Labour charges, manure & fertiliser and miscellaneous charges were accounted major proportion of the operating cost for all three categories of the mango growers.
- The findings of the study revealed that the fish farmers, tomato and mango growers involved in fragmented value chains had higher margin of about 66 per cent, 63 per cent and 59 per cent, respectively, as compared to fish farmers, tomato and mango growers engaged in the flow of these commodities in the integrated value chain.
- The results indicate that marketers involved in each level of value addition in fish, tomato and mango value chain were received comparatively higher proportionate share as net margin in value added (price) to their level than fish farmers, tomato and mango growers. Which indicates that the producers of these commodities were not compete with increased demand for fish, tomato and mango at the market place.
- It was found that there was positive relationship between size of farm business and level of access of the direct informal ‘within the value chain’ finance to high value agriculture (fish, tomato and mango).
- The pattern of value chain financing to high value agriculture (fish, tomato and mango) under direct informal “within the value chain” finance was found to have a “*buyer-driven financial model*”, as financial facilities were given to the farmers in form of input financing, trade credit, warehouse receipts and factoring by value chain actors (input suppliers, traders, commission agents and wholesalers) for their business requirements.
- The study further observed that the trade credit was made available by pre-harvest contractors or traders or commission agents to the farmers through either their surplus fund or wholesalers were taken responsibility as third party for ensuring that the pre-harvest contractors or traders or commission agents repay the individual loans to the bank. Hence, we may say that wholesalers were acted as anchor (creditworthy) value chain actors to the commercial banks to access the indirect formal ‘outside the value chain’ finance.

- The constraints found in high agricultural value chains that limit the financial opportunities of value chain actors were (i) Unpredictable cash-flows resulting from delays in financial transactions, (ii) Complexity arises in recovery of loan given due to prevalent of “Soft” collateral such as guarantees, co-signing etc. in value chain financing, (iii) Value chain loans meet out the only seasonal requirements, (iv) Warehouse receipts systems are usually not available to the individual small producer, (v) No risk mitigation instruments like insurance available, (vi) Low prices at peak periods of harvest/production and (vii) lack of adequate marketing facilities.
- The study suggested that there is a need to lending institutions should design ‘*activity oriented*’ financial products to increase financial access in the value chains of the high value agriculture.
- It may conclude that the Government through cooperatives, producer unions and self-help groups should promote the *producer-driven value chain financing model* as alternative of the *buyer-driven value chain financing model* was prevalent for financing to the value chains of fish, tomato and mango to gain access to remunerative or niche markets, to reduce marketing costs, and to improve their bargaining power. However, financing agencies may enhance their finance to agriculture under buyer driven model by recognizing the anchor actors of the value chains.
- The majority of the actors along the value chains indicated the need for finance to create infrastructure facilities to enhance their business opportunities. Hence, the financing institutions and government should come forward to provide financial support as indirect formal ‘outside the value chain’ finance in addition to technical support particularly small and marginal farmers involved in the value chain of high value agriculture.



1

INTRODUCTION

High Value Crops (HVCs) are those, which give significantly higher value productivity or net income per unit of resources used for production, compared to other competing activities (NABARD, 2020). Sharma and Jain (2011) have found in their study that given the declining share of traditional commodities in production, consumption and trade; high-value agricultural crops signify an important area of potential income growth in rural areas. Kumar *et al.* (2011) have also assessed that traditional way of food production is being replaced by practices more similar to manufacturing processes, with greater co-ordination across farmers, processors, retailers, exporters and other stakeholders in the agriculture value chain. NITI Ayog (2021) has estimated that the growth potential within crop sector lies more in horticulture and other high value commodities compared to traditional food grains sector. Hence, the public policies are geared towards diversification to high-value agriculture — fruits, vegetables, dairy and poultry, etc. — which can generate higher incomes on small farms by establishing shorter value chains and linking farmers to markets.

Agri-food marketing systems are likely to undergo a significant transformation towards demand driven, vertically-coordinated systems, managed by the agribusiness and marketing firms. Integrating small farmers into the demand-driven supply chain through appropriate institutions and policies would be a challenge. The development of this high value segment of agriculture will be possible only when it is pursued as a demand led strategy, closely linked to modern logistics, processing and organised retailing, all as a part of one integrated agri-system in the form of value chains.

Agricultural value chains (AVCs) include a sequence of value adding activities, from production to consumption, through processing and marketing. Each segment of a chain has one or more backward and forward linkages. Miller and Jones (2010) defined a value chain as the sequence of value-adding activities, from production to consumption, through

processing and commercialization. Kumar and Sharma (2016) explained that 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. Agricultural value chains in India are subject to high fragmentation and intermediation, resulting in substantial losses in quantity and quality of produce, limited processing capacities, and high price volatility.

Stein and Barron in their study (2017) described that agricultural producers are not just dependent on what they produce on the land, but also their ability to access resources such as fertilizers, seeds and other inputs “upstream” in a value chain as well as markets to sell their surplus produce “downstream” of where they are situated in a value chain. The downstream chain actors to expand their businesses integrating ‘front end’ activities of wholesaling, processing, logistics and retailing to the ‘back end’ activities of production through institutional arrangements such as contract farming, producers’ associations, etc. In the same way, how producers are embedded in a value chain has implications for their ability to access resources, information and markets.

Value chain financing (VCF) is an approach to identify financing needs and gaps throughout the chain, finance providers and ways to improve access to financing. VCF takes a systematic view point, looking at the health of entire system viz., collective set of actors, processes and markets of the chain as opposed to creditworthiness of an individual lender-borrower within the system. In the traditional forms of agri-finance, such as trade credit or bank finance, the financing is mostly assets based and “on size fits all” and the risks associated with farming are mostly transferred to farmers; whereas in a value chain approach, it is mostly cash flow and contract based and the risks associated with farming is leveraged between various payers in the value chain (Setiya, 2018).

Soundarrajan and Nagrajan (2015) identified that the value chain finance offers an opportunity to expand financing for agriculture, improve efficiency and repayments in financing, and to strengthen or consolidate linkages among participants in value chains. It can improve the quality and efficiency in financing agricultural chains by identifying the financing needed to strengthen the chain, tailoring financial products to suit the needs of the participants in the chain, reducing the financial transaction costs through the direct discounting of loan payments at the time of product sale and using the value chain linkages and knowledge of the chain to mitigate risks to the chain and its partners. The approach allows chain actors an increased access to finance with product market without much emphasis on collateral.

Transactions are intertwined to allow automatic repayments of loans via transaction proceeds in the product market. And, because of scale economies in product as well as financial markets, it reduces lending costs and risks (Miller and Jones, 2010).

A value chain, thus, can be an entry point for financial institutions to improve their outreach to chain actors. The actors have knowledge about activities and relationships of one another other, which the financial institutions cannot access without cost. This enables financial institutions to better evaluate credit worthiness of individuals or firms on the chain; reduce transaction costs; identify risks; analyse competitiveness of the entire chain; and design financial products and services accordingly (Miller 2012).

Fish, tomato and mango are the important commodities in the segment of high value agriculture. Uttar Pradesh ranks first in the Country's total mango production and third in total inland fish production. Further, it contributes 4.3 per cent of Country's total tomato production. Despite significant production, several challenges remain in the development of value chains of these commodities. The value chains of these high value commodities are often fragmented or scattered, lack of cohesion, lack investment, fail to include small and marginal farmers, and are missing critical links between farms and markets. It is important to address these deficiencies to resolve the barriers in diversification towards high value agriculture.

Despite the expansion in credit flow, the demand for credit in agriculture has not been fully met. The gap between supply and demand has estimated to be widening due to focus on market-oriented high value agriculture and higher quality production for remunerative markets in the established value chains. Moreover, Eastern Uttar Pradesh has its own uniqueness as dominance of small and marginal farmers, abundance of traditional crops, practices of subsistence farming and the lack of access to output markets, agri-inputs, improved technology, market information, credit and risk-mitigating instruments etc. resulting those small and marginal farmers in this region are deprived with agricultural credit and, therefore, excluded from the value chain of high value agriculture. Value chain finance offers an opportunity to expand the financing opportunities for agriculture, improve efficiency and repayments in financing, and consolidate value chain linkages among participants in the chain.

Therefore, the present study was taken to highlights the various dimensions of the value chains of commodities (fish, tomato and mango) belong to the segment of high value agriculture. The study was also examined the pattern and level of access of the finance in the value chains of high value agriculture, and was assessed the constraints faced by value chain actors that limit their financial opportunities in the study area.

The specific objectives of the study are as follows :

- (i) To mapping of value chain of high value agricultural commodities (*fish, tomato and mango*).
- (ii) To spotting the potential value chain financing models for high value agricultural commodities.
- (iii) To understand the constraints faced by value chain actors that limit their financial opportunities.

The report of present study has been organized as follows:

The next section has discussed reviews of literatures. Chapter III has examined the study area, data and research methodology. Chapter IV has comprised the demographic and socio-economic information of the sample farmers. Economics of production for high value agriculture has been described in chapter V. The value chain analysis of high value agriculture has been discussed in chapter VI. The pattern and access of the value chain finance have been described in Section VII. Constraints in value chain financing to High Value Agriculture has been analysed in Section VIII. Discussion, conclusions and policy suggestions of the study have been discussed in the final section.



REVIEWS OF LITERATURE

2.1 Value Chains of High-Value Agriculture

The share of most of the high-value commodities has increased over the past two decades, indicating increasing contribution of high-value food commodities to the agricultural growth. Beside demand-side factors, the policies were also supportive to the growth of high-value agriculture as Birthal and Joshi (2006) analysed in their study. Within the agricultural sector, high-value segment is expected to contribute more to the wellbeing of the smallholders, as most high-value commodities require more labour and generate higher returns than cereals (Sharma, 2005; Joshi et al., 2006).

The emergence of integrated agriculture and food supply and value chains is one of the most visible market phenomena in India. Increasing concentration on processing, marketing and export is being observed in all the segments of the chain. Value chain analysis describes the activities that take place in the segment of high value agriculture such as fishery businesses and relates them to an analysis of the competitive strength of the business (De Silva, 2011). A value chain map can serve as a way of identifying and categorizing key market players. CNFO (2014) described that stakeholder mapping and positioning of the different stakeholders within the fisheries sector with a view to determining their engagement, supply capacity, relevance, and position in the fisheries and aquaculture Value Chain. Likewise, Jeyanthi and Chandrasekar (2017) have also reported that the value chain approach is a useful practical tool towards assessing the status of development of fisheries and aquaculture. It is useful for the key Actors such as fishers, managers and policy makers towards streamlining their activities in a cost-effective way.

A well-functioning agri value-chain integrates small holder farmers with other key actors and higher order processes. Plazibat (2016) mentioned that as a challenge in managing and establishing a more efficient market chain, the question arises of how to include small

producers into the modern market chain of fruits and vegetables. Dubey et al. (2020) showed the necessity of tactical policy integration in value chain procedural development in tomato. Reforms are also needed in the existing marketing mechanism to make a change in it, in an 'actor-activity-client oriented beneficial and profitable' direction.

In India, the traditional agri value chains in existence are small scale, unorganised, fragmented and disjointed where the produce traversed through several channels and players, often redundant, requiring several touch points at the farm gate end. An organised agri value chain, in contrast, allows the value chain intermediaries coordinate their value creating activities with one another and, create greater value than otherwise (Nanda et al., 2022). The absence of integrated agri-value chains is primarily the outcome of adopting a fragmented approach to markets.

2.2 Value Chain Finance to High-Value Agriculture

As opposed to conventional financing of a particular segment of the marketing system, value chain finance represents "a flow of funds to different links of the value chain, or among these links, in order to improve efficiency and competitiveness, to reduce risk within the chain and also to promote and develop the chain," Shwedel (2010) explained. The established relationship among the value chain actors influences the flow of the fund throughout the chain as reports of USAID (2009) described that Value chain finance can capitalize on opportunities to leverage existing inter-firm relationships to increase access to appropriate financial products and services for participants throughout the value chain.

The importance of value chain has been recognized in the changing landscape of agriculture and in the same sequence the role of value chain finance has also been established. However, it does not replace conventional finance but complements conventional finance, increasing access to capital and reducing risk for both clients and financiers. Birthal and Joshi (2006) observed that the high-value agriculture is capital-intensive. A lack of adequate finances may act as a deterrent to its growth. The financial and insurance institutions should increasingly focus on high-value agricultural projects. likewise, Ramappa and Manjunatha (2016) have also observed that the majority intermediaries along the value chain indicated the need to enhance their business opportunities. Hence, the banks and government should come forward to provide financial support in addition to technical support for those who are willing invest on activities that promote improvement in the tomato value chain. Patel et al. (2020) have assessed that the value chain of finance offers an opportunity to expand funding opportunities for agriculture, improve efficiency and finance repayments, and consolidate value chain linkages between chain participants.

A value chain, thus, can be an entry point for financial institutions to improve their outreach to chain actors. Actors who create linkages between producers and downstream players are key to expanding the access of rural enterprises to both markets and financial services. Soundarrajan and Nagrajan (2015) in their study found that the approaches for the organised value chains as a new business model in a globalized world and it describes about the great variety of financial arrangements found in India and the actors in the agri-food chain with varying degrees of formality and informality. Casuga et al. (2008) found that the value chains of the agriculture absorbed the financial services both as external and internal finance. The external financing refers to the financing of chain activities by the financial institutions with or without facilitation by the chain sponsor. Internal financing has a greater role in the initial phases of the development of value chains. But, as the value chain consolidates to improve its efficiency and market position, the financial institutions face lower transaction costs and lending risks; external financing overtakes internal financing. Downstream actors of the value chains have played an important role in the flow of internal finance in the value chain as Das and Aquino (2013) found that financial services offered to agriculture sector are quite innovative and consider the importance of the value chain actors in the middle and downstream of the chain. Downstream actors predominantly engaged in integrated value chain and play vital role in flow of financial services across the value chain. Miller (2012) in his study explained that an integrated value chain not only connects producers to others in the chain – input suppliers, intermediaries, processors, retailers and service providers, including financial service providers – but integrates many of these through ownership and/or formal contractual relationships.

Because value chain analysis helps to identify key bottlenecks to economic growth, views financial service gaps in terms of these key bottlenecks, and identifies and incorporates key actors and champions in relevant value chains this tool can be useful in identifying financial services for which there is significant economic demand and interventions that can expand existing supply in efficient and sustainable ways, as Robert and Akin (2004) have mentioned in their study. Swamy and Munusamy (2016) have also assessed that there is a need to review the value chain models that exist in the context of – lead actors, business model and sustainability strategy. They also suggested to determining actual and critical points of finance such as the current flows of funds and their sources of financing, what is needed and in what point in time is significant to enhance the effectiveness of the models and also there is a need to analyze and compare financing options such as their relative strengths, risks and costs of financing for each level of participant in the chain. Mattern and Ramirez (2017) reported that for many of the world's smallholder farming households (smallholders), value chain financing remains either inadequate or entirely out of reach.

2.3 Constraints in Financing to Value Chains of High-Value Agriculture

Agricultural producers were constrained by the cost and availability of inputs, as well as limited access to working capital as explained in the report (USADI, 2005). The report further demonstrated how Access to additional working and investment capital would permit downstream businesses (agro-processors, buyers, etc.) to expand their marketing and processing services. Financial institutions were not responding to this demand for financing because borrowers had limited collateral, bank staff and loan products were not well suited to service the demand, and banks preferred purchasing high-yield T-bills rather than lending. This analysis allowed the Mission to design activities targeting the primary constraints to agricultural enterprise growth in several important sub-sectors. Sharma and Jain (2011) studied that the high-value agriculture-led-growth strategy also provides significant scope for achieving greater commercialization of smallholder agriculture. Despite the potential, the contribution of high-value agricultural exports is still small but increasing. They examine the past and existing performance and identifies likely challenges and opportunities for high-value-agriculture.

In financing value chain, a financial institution needs to have a good handle and understanding of the issues related to the different blocks in the chain; and come up with mitigating measures to address the risks (Das and Aquino, 2013). The demand for high-value commodities (such as horticulture, dairy, livestock and fish) is increasing faster than staple foods—for most of the high-value food commodities demand is expected to increase by more than 100 per cent by 2030. But the challenges are that it is capital intensive, technology intensive that require significant credit support and expertise and the opportunities lie in augmenting farm incomes, generating employment and new business avenues for lenders across the value chain players and nodes (NABARD, 2020). The value chains have mostly been developed for commodities that have higher income potential and strong market demand, but these have remained localized. Mani and Joshi (2017) observed that the external environment in the form of policies, laws, standards, regulations, and institutional support services can have significant impact on the performance of value chains. MP Ensystems (2022) found that the financing rural enterprises is hampered by the following barriers: small ticket size of projects leading to higher transaction cost and reduced interest among lenders; Profile of buyers that lack a formal set-up of businesses accounts and audited balance sheets; Financing structures that require legal, accounting and auditing compliance.

Hypotheses :

1. The value chains of commodities belong to segment of high value agriculture have a longer range of activities leading to a greater number of the value chain actors in the study area.
2. The marketers involved in each level of value addition in value chains of high value agriculture were received comparatively higher proportionate share as net margin in value added to their level than producers of these commodities.
3. Financing to high value agriculture takes place mostly within the value chain (internal financing) under integrated value chain in the study area.
4. Downstream actors of the value chain have played significant role in within the value chain financing.
5. There are deficiencies in financing systems of value chains of high value agriculture in the study area.



STUDY AREA, DATA AND METHODOLOGY

3.1 Study Area and Sampling Methodology

The study is based on extensive field survey and interaction with farmers and value chain actors in the district Azamgarh for fish, Jaunpur for tomato and Varanasi for mango during March-June 2022. Both primary as well as secondary data were collected for the present study. The primary data were collected from the farmers/growers and value chain actors using pre-tested interview schedule. Secondary data were collected from various published and unpublished sources.

A multi-stage purposive-cum-stratified random sampling design was adopted to select study areas and respondents. The Eastern Uttar Pradesh was selected purposively as it is an important producing region of mango, tomato and fish in the state. After the selection of the region of the state, the district Azamgarh for fish, Jaunpur for tomato and Varanasi for mango were selected purposively as these districts accounted substantial area and production of the commodity assigned to them. In the year 2021-22, the area of fish ponds was 1707.9 ha (2069 fish ponds) in district Azamgarh and production of fresh fish in the district was 5620 MT, which was 1 per cent of the total fish production of 620000 MT in the State (Fisheries department, Government of U.P., 2021-22). The area and production of tomato in district Jaunpur was 0.257 ha and 8.456 MT, respectively. Likewise, the area and production of mango in the district Varanasi was 1044 ha and 17299 MT, respectively. Thus, total three districts were selected purposively for the study.

From each sample district, two blocks were selected randomly. Similarly, five villages from each selected block were chosen randomly. Further, 10 farmers from each sample village were selected randomly. Thus, study was comprised a total 300 farmers from 30 villages of 06 blocks of all three districts namely Varanasi, Jaunpur and Azamgarh (table 3.1). The farmers of various category *viz.*, small & marginal farmers (< 1ha.), medium farmers (1-2 ha) and large farmers (> 2 ha), were selected in order of their proportion in the sample population of the respective villages.

The markets of fish, tomato and mango were selected purposively on the basis of arrival of the commodity in the markets by the farmers of the study area. The various actors engaged in fish, tomato and mango business were identified and accordingly those were mapped by direct observation at each node in the marketing of fish, tomato and mango in the study area. There were 44 value chain actors for fish from the markets of district Azamgarh, 46 value chain actors for tomato from the markets of the district Jaunpur and 54 value chain actors for mango from the district Varanasi selected purposively. Thus, total of 144 value chain actors from the districts were taken as a respondent (table 3.2).

The Likert Scale Technique (1932) was deployed to evaluate the views and perceptions of the farmers and value chain actors towards value chain finance in the study area. For this, Likert scales with values of 5, 4, 3, 2 and 1 were developed to determine constraints faced by farmers and value chain actors engaged in high value agriculture (fish, tomato and mango) in the study area. In the same way, value chain actors were enquired to rate their constraint as “Strongly agree”, “Agree”, “Neutral”, “Disagree” and “Strongly disagree”. The variable mean score of 3 was used to ascertain whether the constraint in question was influential or not. The variables with a mean score of 3 and above were considered influential while variables mean with less than 3 was not. The items collected for the study was administrated to the sample of 444 respondents.

Table 3.1. Distribution of sample farmers in the study

Commodity	Districts	Blocks	No. of Villages	Farmers/Growers			
				Marginal & Small	Medium	Large	Total
Fish	Azamagrh	Rani-ki-Saray	05	36	13	3	50
		Bilariyaganj	05	32	10	6	50
(i)	Sub-total	02	10	68	23	9	100
Tomato	Jaunpur	Sikrara	05	31	12	9	50
		Karanjakalan	05	28	15	5	50
(ii)	Sub-total	02	10	59	27	14	100
Mango	Varanasi	Harahua	05	33	10	5	50
		Chiraigaon	05	34	11	7	50
(iii)	Sub-total	02	10	67	21	12	100
Total sample size (i+ii+iii)		06	30	194	71	35	300

Source : Primary survey, 2021- 2022

Table 3.2. Distribution of sample value chain actors in the study

Commodity	Districts	No. of Markets	Value chain actors						
			IS	FSV	PHC	CA	WS	R	Total
Fish	Azamagrh	02	6	6	—	8	—	24	44
Tomato	Jaunpur	02	6	—	—	8	8	24	46
Mango	Varanasi	02	6	—	8	8	8	24	54

IS-Inputs supplier, FSV-Fish Seed Vendor, PHC-Pre-harvest Contractor, CA- Commission agent, WS-Wholesaler, R-Retailer

3.2 Description of the Study Area

Table 3.3. Description of the studyarea

Descriptions	Districts		
	Azamgarh	Jaunpur	Varanasi
No. of villages	3800	3216	1258
Geographicalarea (ha)	405350	399713	152678
Netsownarea (ha)	285875	279074	100849
Gross cropped area (ha)	505906	471074	164479
Netirrigatedarea (ha)	275268	240894	90262
Cropping intensity (%)	177	168	163
Annualrainfall (mm)	1168	1071	770
Majorsoiltypes	Sandy loam	Alluvial calcareous	Alluvial loam
Major crops	Paddy, Wheat, Sugarcane, Potato	Paddy, Wheat, Maize, Sugarcane	Paddy, Wheat, Pea, Bajra

Source: NABARD's Potential Linked Credit Plan (PLP) of respective district for 2022-23.

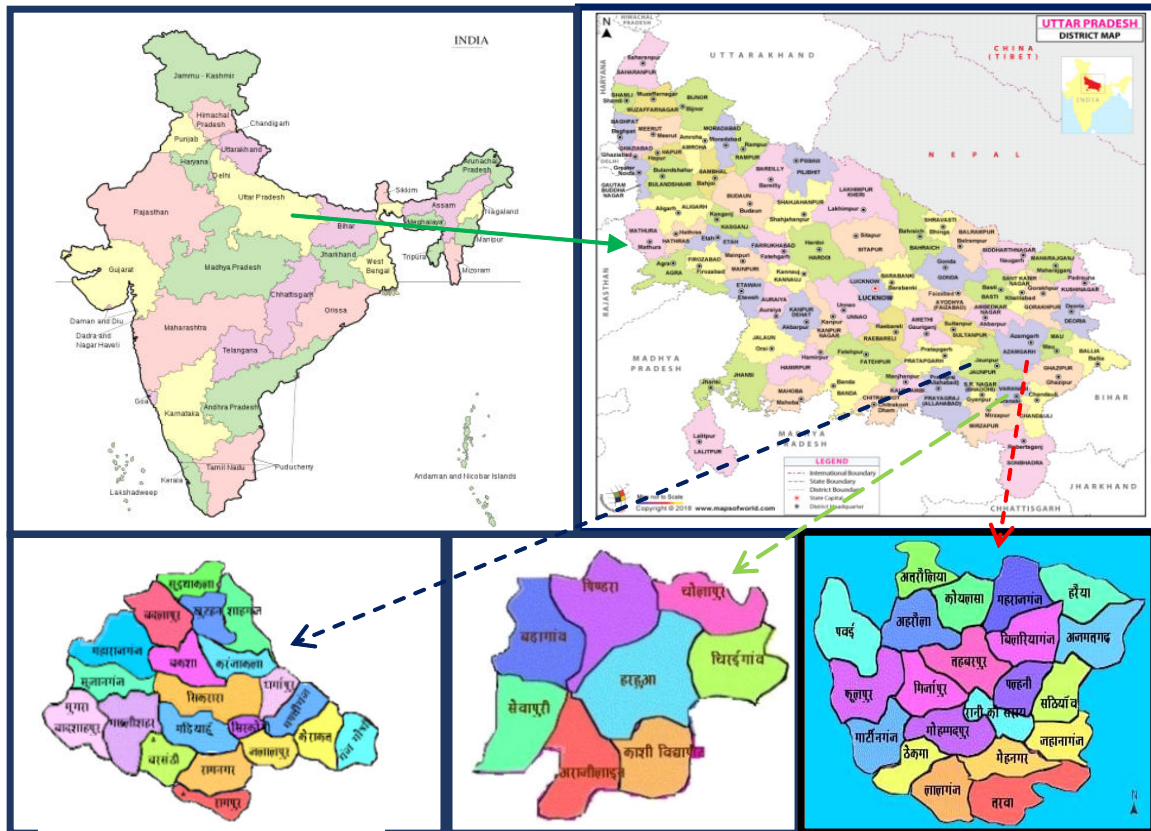


Fig a. State and sample districts for the study

3.3 Analytical Tools & Techniques

The primary data collected were analyzed using various economical/statistical tools. The details of the tools applied were illustrated as follows;

3.3.1 Value addition : The data on value addition by value chain actors including farmers were recorded by taking into consideration of each node in the marketing of fish, tomato and mango in the study area. Kohls and Uhls, (1967) propound the formula to work out the value addition by each value chain actor are given hereunder :

$$\text{Value addition} = \text{Selling Price of the Product} - \text{Cost of the total inputs}$$

3.3.2 Marketing Cost (MC) : MC is calculated by summing up the expenditure incurred for performing marketing functions at each stage of marketing of product.

3.3.3 Marketing Margins (MM) : MM is calculated by subtracting the sum of purchase price and marketing cost from the selling price (Acharya and Agarwal, 2007).

3.3.4 Mean Score : It was calculated to know the average value of particular score under Likert Scale. The formula to work out the mean score are given hereunder :

$$\text{Mean Score} = \frac{\text{Total Score on particular item}}{\text{Number of respondents}}$$

3.3.5 MS EXCEL: The collected data were plotted in excel spread sheet to organize into tabular format for analysis.

3.3.6 B-C Ratio : The benefit-cost ratio (BCR) is calculated as the present value (PV) of benefits divided by the present value (PV) of costs.



4

DEMOGRAPHIC AND SOCIO-ECONOMIC INFORMATION

In general, the socio-economic variables like age, education of the farmers, experience in farming etc. influence the decision making and selection of enterprises of the farmers. In this chapter, the details of demographic information such as age, education level, experiences and occupation were discussed. The important socio-economic characteristics of sample farmers are presented in table-4.1 to 4.4.

4.1 Demographic Characteristics of Sample Fish Farmers

The socioeconomic characteristics such as age, education, experience and occupations of the fish farmers of the study area were studied and same has presented in table 4.1. The table shows that the percentage of fish farmers under 40 years of age in the study area was 35 per cent while 67 per cent of fish farmers were above 65 years of age, indicating that the fish farming was taken up by both middle-aged adults to old aged farmers. It is further observed from the table that the level of education of 78 per cent fish farmers was intermediate or below. Only 22 per cent of fish farmers had completed graduation or above indicating that fish farming was unable to engage the highly educated people. The result further shows that 33 per cent of fish farmers had experiences of more than 10 years and 42 per cent of fish farmers between 5 to 10 years while 25 per cent of fish farmers had less than 5 years of experiences in fish cultivation. It was also found that majority of the fish farmers were involved in fisheries along with agriculture (49%) followed by fisheries together with poultry (29%), fisheries only (12%) and fisheries with other business (10%).

Table 4.1. Age, education, experience and occupation of the fish-farmers ($n=100$)

Age group		Education		Experience		Occupation	
Years	(%)	Group	(%)	Years	(%)	Name	(%)
< 30	06	Primary	16	< 5	25	Fish & crops	49
30-40	29	Secondary	23	5-10	42	Fish only	12
40-50	44	Sr. Secondary	39	> 10	33	Fish & poultry	29
> 50	21	Graduate & above	22	-	-	Fish & others	10

Source: Primary survey, 2021-22

4.2 General Details of Sample Fish Farms

The size of the pond plays a major role in fish cultivation. It influences the input uses, technology adoption, level of production and the income generation for the farmers. Further, leasing of ponds gives an opportunity to farmers to realise the benefit of economies of scale by increasing the average size of the ponds. The average size of pond in the study area was 2.59. It was 1.39 acre, 3.88 acre and 8.32 acre for marginal and small farmers (68%), medium farmers (23%) and large farmers (9%) in the study area, respectively (table 4.2). The increase in the average size of their pond by all categories of fish farmers was done through lease. It is observed from the table (4.2) that 73 per cent of the total ponds in the study area were leased-in ponds because the leased-in activity of pond is very common among the fish farmers of the study area. It was 67 per cent, 78 per cent and 83 per cent for marginal and small, medium and large farm respectively.

Table 4.2. General details of sample fish farms

Particulars	Marginal & small	Medium	Large	Total
Sample farms (no.)	68	23	09	100
Sample farms (%)	68	23	09	100
No. of ponds	93	49	36	178
Average size of ponds (acre)	1.39	3.88	8.32	2.59
No. of leased-in ponds	62	38	30	130
Leased-in Pond to total ponds (%)	67	78	83	73

Source : Primary survey, 2021-22

4.3 Demographic Characteristics of Sample Tomato Growers

The important socio-economic characteristics of tomato sample farmers are presented in in table 4.3. It is observed from the table that the percentage of tomato growers under 40 years of age in the study area was 33 per cent only while 67 per cent of tomato growers were above 40 years of age, indicating that youth involvement in tomato enterprise was low. On the other hand, the level of education of 83 per cent tomato growers was intermediate or below. Only 17 per cent of tomato growers had completed graduation or above. The result further shows that 41 per cent of tomato growers had experiences of more than 10 years. The remaining 58 per cent of the tomato growers were working to grow tomatoes for less than 10 years. It was also found that most of the tomato growers (86%) grew cereal crops or other vegetable crops along with tomato crops in the study area.

Table 4.3. Age, education, experience and occupation of the tomato growers ($n = 100$)

Age group		Education		Experience		Occupation	
Years	(%)	Group	(%)	Years	(%)	Name	(%)
< 30	13	Primary	18	< 5	22	Fish & crops	57
30-40	20	Secondary	29	5-10	37	Tomato only	--
40-50	44	Sr. Secondary	36	> 10	41	Tomato & vegetable	29
> 50	23	Graduate & above	17	-	-	Tomato & others	14

Source: Primary survey, 2021-22

4.4 Demographic Characteristics of Sample Mango Growers

The important socio-economic characteristics of mango sample growers are presented in Table 4.4. It shows that the percentage of mango growers under 40 years of age was 28 per cent only while remaining 72 per cent of mango growers were above 40 years of age in the study area, indicating that youth involvement in mango enterprise was low. The level of education of sample mango farmers was also ascertained and present in the same table. It shows that 79 per cent of the sample mango growers were educated till intermediate. Only 21 per cent of the sample mango growers were studied up to graduation, indicating that participation of highly qualified farmers in the mango production were very low. The table further shows that 53 per cent of mango growers had experiences of more than 10 years. The remaining 47 per cent of the mango growers were working to grow mangoes for less than 10 years. It was also found that most of the mango growers (80%) in the study area grew mango along with other crops.

Table 4.4. Age, education, experience and occupation of mango growers ($n = 100$)

Age group		Education		Experience		Occupation	
Years	(%)	Group	(%)	Years	(%)	Name	(%)
< 30	5	Primary	11	< 5	18	Mango & crops	80
30-40	23	Secondary	22	5-10	39	Mango only	07
40-50	49	Sr. Secondary	46	> 10	43	Mango & others	13
> 50	23	Graduate & above	21	-	-	-	-

Source: Primary survey, 2021-22



ECONOMICS OF PRODUCTION FOR HIGH VALUE AGRICULTURE

Production of high value agriculture is highly input intensive in nature. It requires higher level of expenditure on labour, fertilizer, plant protection etc. as compared to other segments of agriculture. The analysis regarding cost and returns would be beneficial for the farmers and policy planners to know about the comparative efficiency of enterprises belong to high value agriculture. Further, in high value agriculture, the cost of cultivation is an important factor that affects the efficiency of the entire value chain. In this chapter, the details about various aspect of cost of cultivation of segments of high value agriculture (fish, tomato and mango) and benefit cost ratio are explained.

5.1 Cost of Cultivation and B-C Ratio in Fish Cultivation

Economic performance of fish farms is presented in Table 5.1. The cost incurred on different input items was calculated on per acre basis. It shows that the average operating cost for cultivation of fish was ₹ 132500, ₹ 132500 and ₹ 259060 per acre for marginal and small, medium and large fish farms in the study area. Feed cost and fingerlings costs were the most important costs for all three categories of the fish farms (marginal and small, medium and large fish farms) in fish cultivation in the study area. Feed cost for marginal and small, medium and large fish farms was accounted 63 per cent, 75 per cent and 82 per cent respectively. Similarly, the cost of fingerlings for marginal and small farms, medium farm and large farms was accounted 15 per cent, 14 per cent and 13 per cent respectively. Except feed cost, which was increased with size of farm, all other operating or variable costs for fish cultivation were decrease with increase in size of farm. The cost per acre of fish cultivation including rental value of land was ₹ 164500 ₹ 244950 and ₹ 291060 on marginal and small farms, medium farm and large farms respectively.

Table 5.1. Cost of cultivation and B-C ratio in fish cultivation

S. No.	Particulars	Small & marginal	Medium	Large
1.	No. of sample farmers	68	23	09
2.	Items of the expenditure	Cost ₹/acre	Cost ₹/acre	Cost ₹/acre
i)	Fish seed (<i>Piyasi+Rohu+Desi in 80:10:10 ratio</i>)	20000 (15)	30000 (14)	32000 (13)
ii)	Commercial feed	84000 (63)	159600 (75)	205000 (82)
iii)	Desi feed	5400 (4)	--	--
iv)	Manuring, liming & salt application	2800 (2)	2650 (1)	2330 (0.9)
v)	Congential water	8700 (6)	7860 (4)	6570 (3)
vi)	Medicine	2700 (2)	2540 (1)	2180 (0.8)
vii)	Labour charges	6300 (5)	6430 (3)	6700 (3)
viii)	Miscellaneous (<i>Feeding, Watch, ward, Transportation of inputs etc.</i>)	2600 (2)	3870 (2)	4280 (2)
3.	Total variables cost (i+ii+iii+iv+v+vi+vii+viii)	132500 (100)	212950 (100)	259060 (100)
4.	Rental value of land	32000	32000	32000
5.	Total Cost with rental value of land	164500	244950	291060
6.	Yield (q/acre)	28	48	65
7.	Market price (₹/q)	10000	10000	10000
8.	Gross Returns	280000	480000	650000
9.	B:C ratio on variable cost	2.11	2.25	2.32

***Figures in the parentheses indicate percentages to the row total.*

Source: Primary survey, 2021-22

The table 5.1 also displays the per acre production of fresh fish across the size of fish farms. The production of fresh fish per acre was 28 q, 48 q and 65 q for marginal and small farms, medium and large farms, respectively. Benefit cost ratio was also presented in this table. It is also obvious from the table that the benefit-cost ratio was found highest being 2.32 for large fish farms followed by 2.25 for medium fish farms and 2.11 for marginal and small fish farms. This can be attributed to increasing gross return per acre across the higher size categories of farms and proportionate reduction in the costs.

5.2 Cost of Cultivation and B-C Ratio in Tomato Cultivation

Average cost and return structure of tomato crop were estimated for different categories of farms are displayed in table 5.2. It shows that the average operating cost for cultivation of tomato was ₹ 27704, ₹ 34111 and ₹ 43802 per acre for marginal and small, medium and large tomato farms in the study area. Labour charges and manure & fertiliser were the most important costs for all three categories of the tomato farms (marginal and small, medium and large tomato farms) in the study area. Labour charges for marginal and small farms, medium farm and large farms were incurred 63 per cent, 60 per cent and 48 per cent to total variable cost for the cultivation of per acre of tomato respectively.

On the other hand, cost of manure & fertiliser for marginal and small, medium and large tomato farms was accounted 16 per cent, 17 per cent and 20 per cent respectively. Cost incurred for field preparation, seed cost and labour charges for tomato cultivation were decrease with increase in size of farm. The expenditure incurred for plant protection materials and cost of manure & fertilisers for tomato cultivation was found to increase with increase in size of farms in the study area. The expenditure on irrigation and miscellaneous items was almost same for all categories of tomato farmers, indicating that difference in these costs for marginal and small, medium and large categories of farms was negligible. The cost per acre including rental value of land for tomato cultivation was ₹ 38370, ₹ 44777 and ₹ 54568 for marginal and small farms, medium farm and large farms respectively. The table 5.2 also displays the per acre production of tomato across the size of tomato farms. The production of fresh tomato per acre was 64 q, 89 q and 125 q for marginal and small, medium and large tomato growers, respectively. Benefit cost ratio was also presented in this table. It reveals that the benefit-cost ratio for tomato cultivation was highest being 2.31 for large tomato farms followed by 2.08 and 1.82 for medium and marginal and small tomato farms in the study area respectively. It can be concluded from the above description that benefit cost ratios were invariably highest in large size category of farms than any other categories of farms in the study.

Table 5.2. Cost of cultivation and B-C ratio in tomato cultivation

S. No.	Particulars	Small & marginal	Medium	Large
1.	No. of sample farmers	59	27	14
2.	Items of the expenditure	Cost ₹/acre	Cost ₹/acre	Cost ₹/acre
i)	Field preparation	1018 (3.6)	1214 (3.5)	1429 (3)
ii)	Seed cost	2357 (8.5)	3035 (9)	3613 (8)
iii)	FYM & fertilisers	4366 (16)	5688 (17)	8753 (20)
iv)	Irrigation	758 (2.7)	938 (2.7)	1231 (2.8)
v)	Staking	--	--	4322 (9)
vi)	Plant protection materials	445 (1.5)	723 (2)	1181 (2.6)
vii)	Labour charges	17380 (63)	20760 (60)	21045 (48)
viii)	Miscellaneous	1380 (5)	1753 (5)	2228 (5)
3.	Total variables cost (i+ii+iii+iv+v+vi+vii+viii)	27704 (100)	34111 (100)	43802 (100)
4.	Rental value of land	10666	10666	10666
5.	Total Cost with rental value of land	38370	44777	54568
6.	Yield (q/acre)	64	89	125
7.	Market price (₹/q)	800	800	800
8.	Gross Income	51200	71200	99200
9.	B:C ratio on variable cost	1.84	2.08	2.31

****Figures in the parentheses indicate percentages to row total.**

Source: Primary survey, 2021-22

5.3 Cost of Cultivation and B-C Ratio for Mango Cultivation

Average cost of cultivation and B-C ratio for mango cultivation were estimated for different categories of farms are displayed in table 5.3. It shows that the average operating cost for cultivation of mango was ₹ 45989, ₹ 58275 and ₹ 72620 per acre for marginal and small, medium and large mango growers in the study area, respectively. Labour charges, manure & fertiliser and miscellaneous charges were accounted major proportion of the operating cost for all three categories of the mango growers (marginal and small, medium and large fish farms) for the cultivation of mango in the study area. Labour charges on marginal and small, medium and large mango growers was incurred almost same for all categories of mango growers accounted 56-57 per cent to total variable cost for the cultivation of per acre of mango. Likewise, cost of manure & fertiliser for marginal and small, medium and large mango growers was accounted 16 per cent, 16.7 per cent and 17 per cent to total variable cost incurred for the cultivation of mango respectively. The variable cost for all the expenditure items for the cultivation of mango were either increasing or almost same in proportion with increase in size of mango farms in the study area. which was mainly attributed to nature of management practices adopted by the different category of the farms. The cost per acre including rental value of land for mango cultivation was ₹ 77989, ₹ 90275 and ₹ 104620 for marginal and small, medium and large mango growers in the study area, respectively.

The per acre production of mango was also mentioned in the table 5.3. It shows that production of mango per acre was 113 q, 162 q and 300 q for marginal and small, medium and large mango growers in the study area, respectively. The benefit and cost ratio were estimated for the various categories of the mango growers and presented in the table 5.3. It displays that the benefit-cost ratio for mango cultivation was highest being 4.95 for large mango growers followed by 3.34 and 2.95 for medium and marginal and small marginal tomato growers in the study area, respectively. The increase in the B-C ratio with the increase in the size of farm was due to the difference in cost arises due to the management practices adopted on different farms and the proportionate increase in production.

Table 5.3. Cost of cultivation and B-C ratio in mango cultivation

S. No.	Particulars	Small & marginal	Medium	Large
1.	No. of sample farmers	67	21	12
2.	Items of the expenditure	Cost ₹/acre	Cost ₹/acre	Cost ₹/acre
i)	Labour charges	26387 (57)	32698 (56)	41600 (57)
ii)	FYM & fertilisers	7302 (16)	9734 (16.7)	12600 (17)
iii)	Irrigation charges	2890 (6)	3373 (5.7)	3750 (5)
iv)	Plant protection materials	1580 (3.4)	1930 (3.3)	2570 (3.5)
v)	Miscellaneous	7830 (17)	10540 (18)	12100 (16.6)
3.	Total variables cost (i+ii+iii+iv+v)	45989 (100)	58275 (100)	72620 (100)
4.	Rental value of land	32000	32000	32000
5.	Total Cost with rental value of land	77989	90275	104620
6.	Yield (q/acre)	113	162	300
7.	Average market price (₹/q)	1200	1200	1200
8.	Gross Income	135600	194900	360000
9.	B:C ratio on variable cost	2.95	3.34	4.95

***Figures in the parentheses indicate percentages to row total.*

Source: Primary survey, 2021-22

6

VALUE CHAIN ANALYSIS OF HIGH-VALUE AGRICULTURE (*FISH, TOMATO AND MANGO*)

The value chain approach considers the role of existing chain actors, supporting actors, and the policy environment. The value chains of commodities of high value agriculture are unique, and contains a unique combination of “links”. In this chapter, economic analysis of product flows in entire value chain of specified commodities (fish, tomato and mango) has been carried out.

6.1 Mapping of Value Chain for High-Value Agriculture

Value chain mapping is an innovative methodology in which an illustrative way of recording the process, activities, actors and the value created in a commodity with the reformative changes in space-time-form continuum (FAO, 2014). In the present study, value chain mapping of commodity belong to the segment of high value agriculture (fish, tomato and mango) has been mapped in a logical framework with the collection of the information on various aspects of the value chains. This section shows the results about value chain mapping and actors involved in various chains for disposal of fish, tomato and mango in the study area.

6.1.1 Value Chain Actors and their Roles in Value Chains of Fish

The study identified main value-chain actors (Input suppliers, Fish seed vendors, Fish farmers, Traders, Commission agent-cum-wholesalers and retailers) who were involved in value-adding (price) of fish in the study area *i.e.*, district Azamgarh of Eastern Uttar Pradesh. The roles as functions, of value chain actors in fish value chain were also identified. The value chain actors and their functions in value chains of fish are catalogued in table 6.1 given hereunder.

Table 6.1 Activities performed by actors involved in value chains of fish

S. No.	Value chain actors	Functions
1.	Inputs suppliers	Supply of inputs
2.	Fish seed vendors	Supply of fingerlings
3.	Fish farmers	Production of fish
4.	Traders	Collection, assembling and transportation
5.	Commission agents-cum-Wholesalers	Purchase and collection of fresh fishes from the fish farmers/traders and Distribution to retailers
6.	Primary retailers	Purchase and sale to consumers
7.	Secondary retailers	Purchase and sale to consumers
8.	Consumers	Consumption

6.1.2 Value Chains for Disposal of Fish

The detailed descriptions of value chain map of fish in Azamgarh district were illustrated in Figure 1. This shows the map of the overall fish value chain, the segments, their interdependencies and linkages in the study area. The value chains for the disposal of fish across the value chain were (I) *Input suppliers – Fish farmers – consumers (fragmented value chain)*; (II) *Input suppliers – Fish farmers – Commission agents-cum-wholesalers – Retailers – Consumers (integrated value chain)* and (III) *Input suppliers – Fish farmers – Traders – Commission agents-cum-wholesalers – Retailers – Consumers (integrated value chain)*. The value chain I, chain II and chain III were accounted about 13 per cent, 18 per cent and 69 per cent flow of volume of the fresh fish in the study area, respectively.

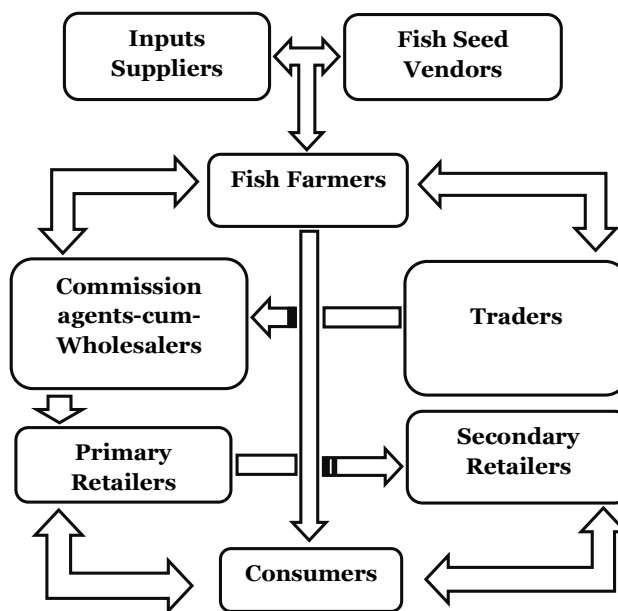


Fig 1. Value chain of fish in Azamgarh district of Eastern Uttar Pradesh

6.1.3 Value Chain Actors and their Roles in Value Chains of Tomato

The value-chain actors (Input suppliers/agro-dealer, tomato grower, commission agent, wholesaler, and retailers) who were involved in value-adding (price) of tomato and their roles in the value chain were identified and presented in table 6.2.

Table 6.2. Activities performed by actors involved in value chain oftomato

S. No.	Value chain actors	Functions
1.	Inputs suppliers/Agro-dealers	Supply of inputs
2.	Tomato growers	Production of tomato
3.	Commission agents	Provide the link between tomato growers and wholesalers in distant markets
4.	Wholesalers	Procure and sale to the various type of retailers
5.	Primary/ Secondary /organised retailers	Purchase from wholesalers and sale to consumers
6.	Consumers	Consumption

6.1.4 Value Chains for Disposal of Tomato

The value chain for disposal of tomato as prevalent in the study area is depicted in Figure 2. It confirms the map of the overall tomato value chain, the segments, their interdependencies and associations.

The value chains for the disposal of tomato across the value chain were (I) *Input suppliers/Agro-dealers – Tomato growers – Household consumers (fragmented value chain)*; (II) *Tomato growers – Cold storages – Wholesalers – Retailers – Consumers (integrated value chain)* and (III) *Tomato growers –Commission agents – Wholesalers – Retailers – Consumers (integrated value chain)*. The value chain I, chain II, and chain III were accounted about 14 per cent, 6 per cent and 80 per cent flow of volume of the fresh tomato in the study area, respectively.

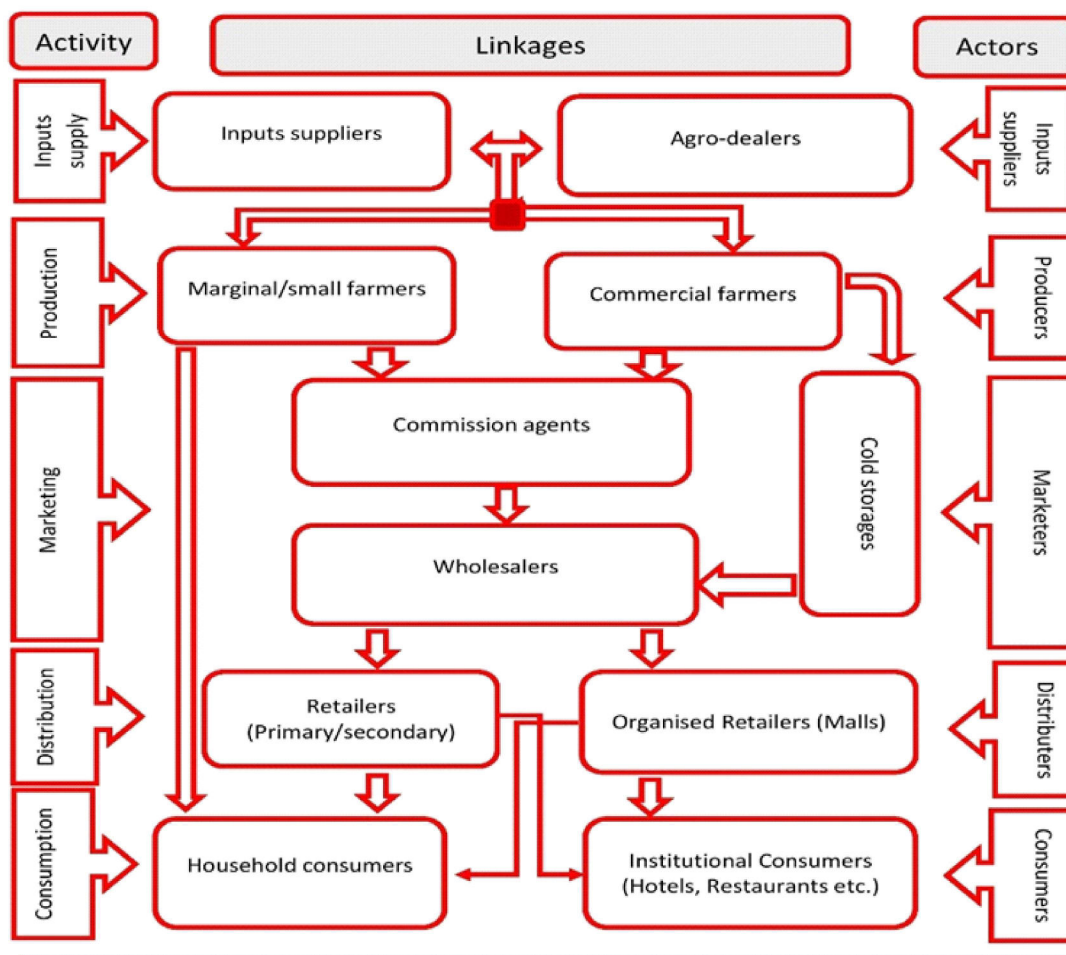


Fig 2. Value chain of tomato in Jaunpur district of Eastern Uttar Pradesh

6.1.5 Value Chain Actors and their Roles in Value Chains of Mango

The main value chain actors such as Inputs suppliers/agro-dealer, mango grower, pre-harvest contractor, commission agents and retailer were found to be involved in the prevailing value chain for disposal of mango in the study area. The roles of each value chain actors engaged in value chain were identified and presented in table 3.5 given below.

Table 6.3. Activities performed by actors involved in value chain of mango

S. No.	Value chain actors	Functions
1.	Inputs suppliers/agro-dealer	Supply of inputs
2.	Mango grower	Production of mango
3.	Pre-harvest contractor	The pre-harvest contractors were contracted the orchard at flowering or fruiting stage for a period ranging from one to three years
4.	Commission agents	The commission agents were provided the finances to pre-harvest contractors/farmers, who obliged to dispose of the produce through relevant commission agents
5.	Wholesalers	Purchase and collection of fresh mangoes from the commission agents and distributed to retailers
6.	Retailers (Traditional, cart vendor, juice vendor, mall)	Purchase and sale to consumers

6.1.6 VALUE CHAINS FOR DISPOSAL OF MANGO

The detailed descriptions of value chain map of mango in Varanasi district were illustrated in Figure 3. It displays the map of the overall value chain of mango, the components and linkages within the chain in the study area. The value chains for the disposal of mango across the value chain were (I) *Input suppliers/Agro-dealers – Mango growers – Household consumers (fragmented value chain)*; (II) *Input suppliers/Agro-dealers – Mango growers – Pre-harvest contractors – Consumers (integrated value chain)* (III) *Input suppliers/Agro-dealers – Mango growers – Commission agents – Retailers – Consumers(integrated value chain)* and (IV) *Input suppliers/Agro-dealers – Mango growers – Commission agents – Wholesalers – Retailers – Consumers (integrated value chain)*. The value chain I, chain II, chain III and chain IV were accounted about 10 per cent, 4 per cent, 2 per cent and 84 per cent flow of volume of the fresh mango in the study area, respectively.

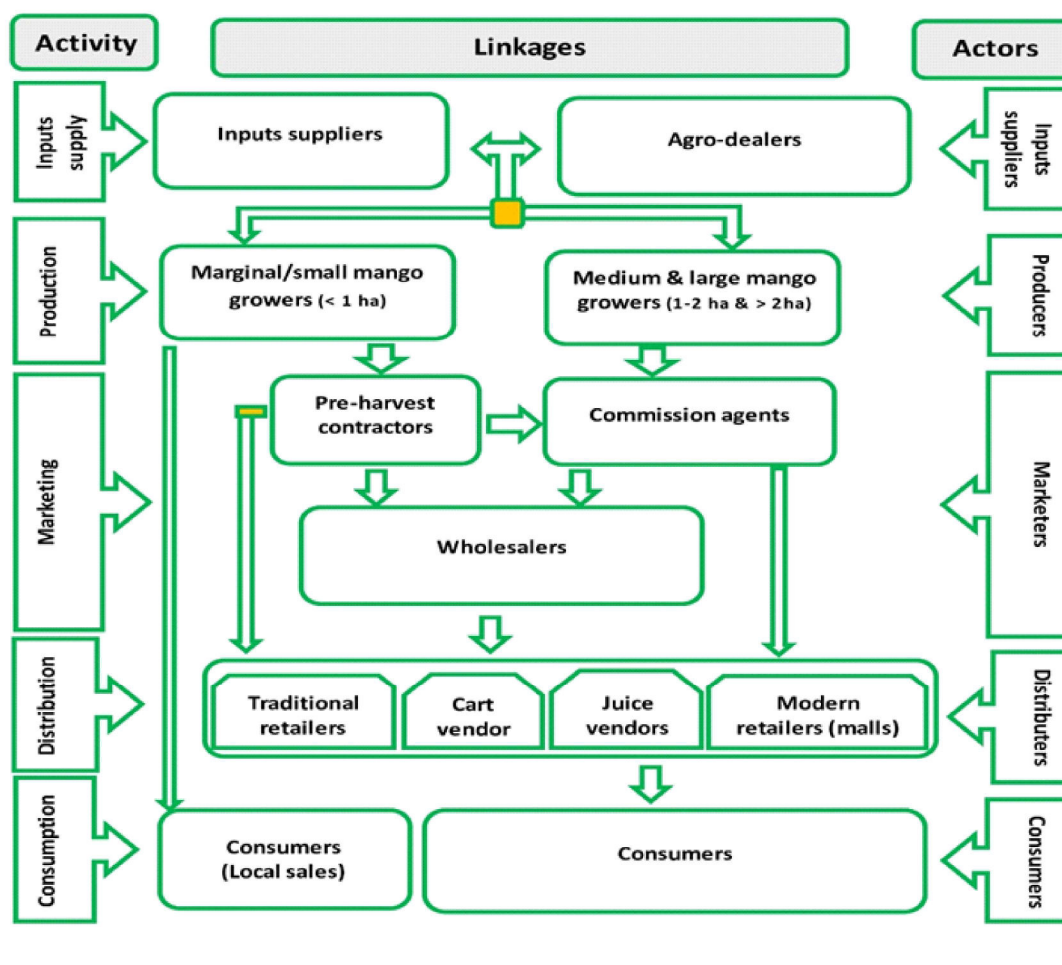


Fig 3. Value chain of mango in Varanasi district of Eastern Uttar Pradesh

6.2 Economic Analysis of Value Chains of High-Value Agriculture

The value chains carried the flow of commodities belong to high value agriculture (fish, tomato and mango) was analysed. The value addition and net margins by received by each value chain actor were analysed to enquired the proportionate share of each value chain actor in the value addition to his level. The marketing costs incurred each marketing node were also computed. The value-added share implies the percentage share of an actor in the total value added in the value chain system. The value added of an actor in the chain is achieved as the price differential of the value-added product sold to the subsequent actor

and the price the primary product acquired from the preceding actor and this is captured the form transformation, place and time value added in the course of the respective activities of actors in the chain (Coulibaly et. al., 2010).

6.2.1 Marketing Costs, Net Margins and Value-Added Share in Disposal of Fish

The results of the marketing costs, net margins and value-added share of each actor (Input suppliers/agro-dealer, tomato grower, commission agent, wholesaler, and retailers) in the value chains (fragmented and integrated) of fish presented in table 4.4.

This shows that the marketing charges were highest being Rs 957 per quintal at the level of trader followed by ₹ 892, ₹ 625 and ₹ 95 at the level of fish producer, commission agent-cum- wholesaler and retailer in the integrated value chains (chain-II & III), respectively. Whereas the marketing cost borne by fish farmers as retailers in the fragmented value chain (chain-I) was ₹183, which was about 80 per cent less than the marketing cost borne by the fish farmers involved in the integrated value chain. The value addition (price) stood highest being ₹ 1500 per quintal at both level of trader and commission agent-cum-wholesaler followed by ₹ 1000 and ₹ 500 per quintal at level of fish producer and retailer in the integrated value chain, respectively. The value addition (price) made by the fish producers in the fragmented value chain was ₹ 800.

The table 6.4 further displays the value-added share (as percentage of total value added) for each value chain actors engaged in value chain of fish in the study area. It was depicted that the share of value added was highest being 79 per cent at the level of retailer followed by 58.33 per cent, 36.2 per cent and 10.8 per cent at the level of commission agent-cum-wholesaler, trader and fish producer in integrated value chain, respectively. Which indicates that the proportionate share in net value added by value chain actors was increasing from the production to consummation with the fish producer had the lowest share whereas the marketers (trader, commission agent, wholesaler and retailer) had highest share in the integrated value chains. The proportionate share of each value chain actors in the value addition of fish to their level in the integrated value chain is illustrated in Figure 4.

It was further estimated that 43 per cent of the total sample fish farmers had adopted both integrated and fragmented value chains for flow of fish in the study area. The net margin of 43 fish farmers who flow fish through a fragmented value chain was found 77 per cent, while the net margin of sample fish farmers who flowed fish through an integrated value chain was 10.8 per cent. Thus, fish farmers in the fragmented value chain had a higher margin of about 66 per cent as compared to fish farmers engaged in the flow of fish in the integrated value chain.

Table 6.4. Marketing costs, net margins and value addition in disposal of fish (₹ /Qntl.)

S. No.	Particulars/ Performance indicators	Fragmented value chain (Value chain-I)		Integrated value chain (Value chain-II & III)			
		Fish farmers (n=43)	Fish farmers as retailers	Fish farmers (n=100)	Traders	Commission agents-cum- Wholesalers	Retailers
1.	Farm gate price	10000 (on pond)	—	10000	—	—	—
2.	Purchase price	—	10000	—	10000	11500	13000
3.	Selling price	—	10800	11000	11500	13000	13500
4.	Marketing Costs		183	892	957	625	95
i)	Fishing		165	200	200	—	—
ii)	Transportation	—	—	142	142	—	25
iii)	Mandi charges @5% of sale value	—	—	550	575	615	—
iv)	Boxing	—	—	—	40	—	—
v)	Weighing and others		18	—	—	10	5
vi)	Icing & dressing	—	—	—	—	—	75
5.	Value addition (Price)	—	800	1000	1500	1500	500
6.	Net Margins	—	617	108	543	875	395
7.	Net margins (as percentage of value added)	—	77	10.8	36.2	58.33	79.00

Source : Primary survey, 2021-22

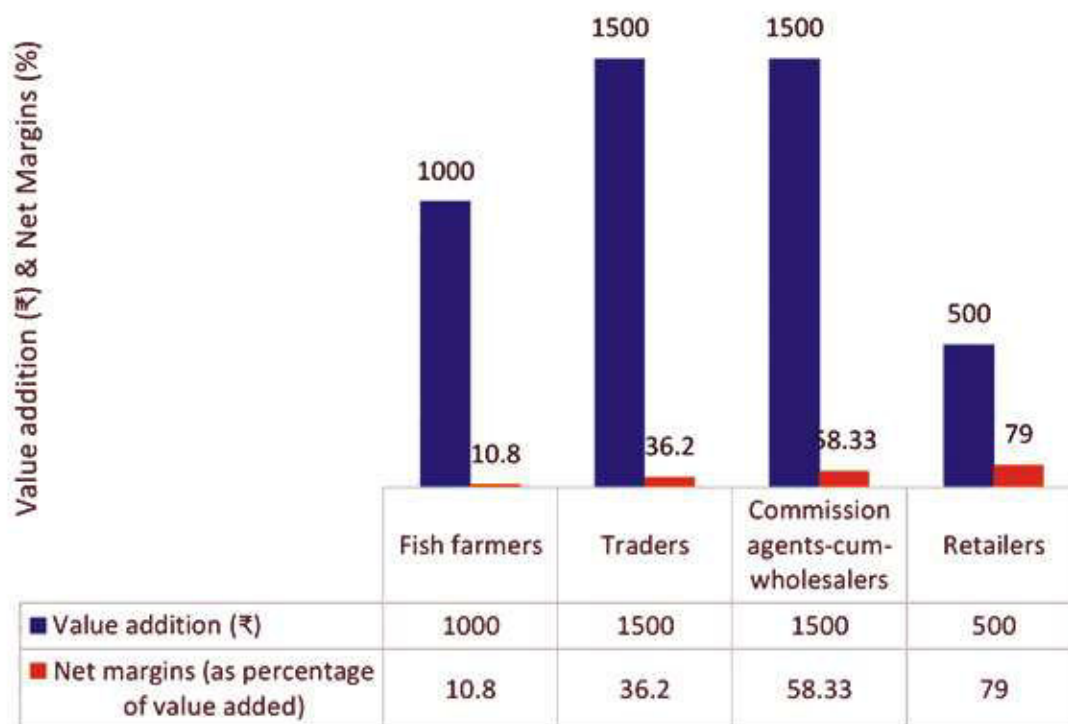


Fig 4. Value addition & Net Margins (%) in fish value chain

6.2.2 Marketing Costs, Net Margins and Value-Added Share in Disposal of Tomato

The results of the marketing costs, net margins and value-added share of each actor (Input suppliers/agro-dealer, tomato grower, commission agent, wholesaler, and retailers) in tomato value chains (fragmented and integrated) is presented in table 6.5.

This reveals that the marketing charges was highest being ₹ 188 per quintal at the level of tomato growers followed by ₹ 145, ₹ 88 and ₹ 70 at the level of wholesalers, commission agents and retailers in integrated value chains (chain II & III), respectively. Whereas, the marketing cost borne by tomato growers as retailers in the fragmented value chain (chain-I) was ₹ 125, which was about 44 per cent less than the marketing cost borne by the tomato growers engaged in the integrated value chain (chain-II and III). The value addition (price) stood highest being ₹ 625 per quintal at level of wholesalers followed by ₹ 200 for both tomato growers and retailers and ₹ 175 per quintal at level of commission agents in integrated value chains of tomato. The value addition (price) made by the tomato growers as retailers in the fragmented value chain was ₹ 400.

Table 6.5. Marketing costs, net margins and value addition in disposal of tomato (₹/Qntl.)

S. No.	Particulars/ Performance indicators	Fragmented value chain (Value chain-I)		Integrated value chain (Value chain-II, III & IV)			
		Tomato growers (n=27)	Tomato growers as retailers	Tomato growers (n=100)	Commission agents	Wholesalers	Retailers
1.	Farm gate price	800	—	800	—	—	—
2.	Purchase price	—	800	—	1000	1175	1800
3.	Selling price	—	1200	1000	1175	1800	2000
4.	Marketing Costs	—	125	188	88	145	70
i)	Cleaning	—	12	12	—	6	
ii)	Packing materials	—	46	54	—	8	
iii)	Transportation, loading & unloading	—	32	50	—	5	50
iv)	Mandi charges @6% of sale value	—	—	72	70	108	—
v)	Local charges	—	—			—	15
vi)	Grading & boxing	—	—	—	—	12	—
vii)	Weighing and others	—	12	—	—	3	—
viii)	Miscellaneous charges	—	23	—	18	3	5
5.	Value addition (Price)	-	400	200	175	625	200
6.	Net Margins	—	275	12	87	480	130
7.	Net margins (as Percentage of value added)	—	69	6	49	76	65

Source : Primary survey, 2021-22

The table also reveals the value-added share (as percentage of total value added) for each value chain actors engaged in value chain of tomato in the study area. It was portrayed that the share of value added was highest being 76 per cent at the level of wholesalers followed by 65 per cent, 49 per cent and 6 per cent at the level of retailers, commission agents, retailers and tomato growers in integrated value chain, respectively. This indicates that marketers involved in each level of value addition in tomato value chain were received comparatively higher proportionate share as net margin in value added to their level than tomato growers. The proportionate share of each value chain actors in the value addition of tomato to their level in integrated value chain is illustrated in Figure 5.

It was also found that 27 per cent of the total sample tomato growers had adopted both integrated and fragmented value chains for flow of tomato from producer to consumer. The net margin of 27 tomato growers who flow tomato through a fragmented value chain was found 69 per cent, while the net margin of sample tomato growers who flowed tomato through an integrated value chain was 6 per cent. Thus, tomato growers in the fragmented value chain had a higher margin of about 63 per cent as compared to tomato growers engaged in the flow of tomato in the integrated value chain.

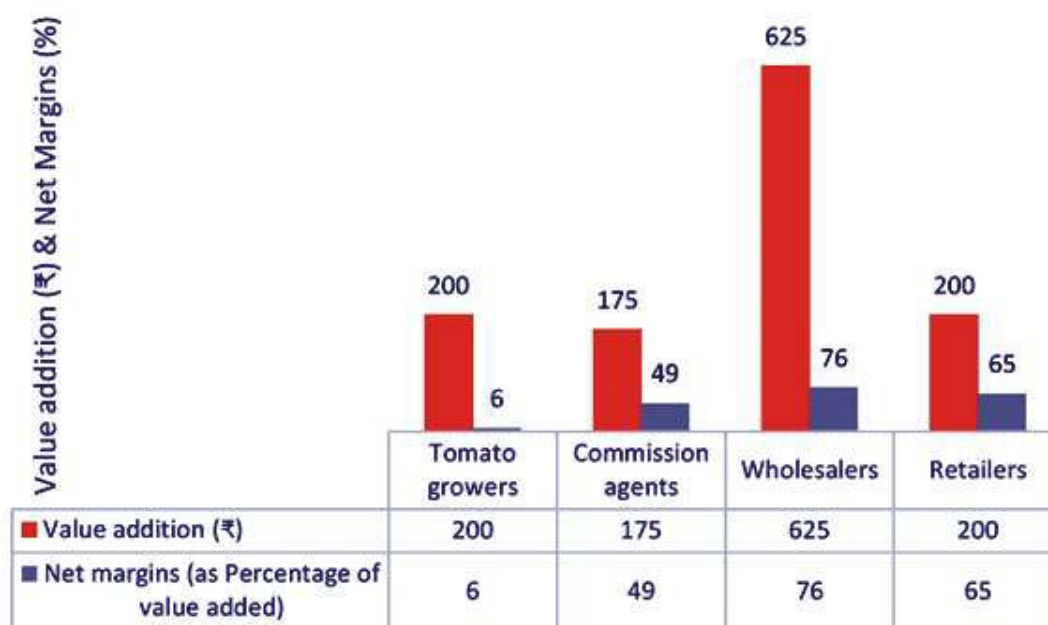


Fig 5. Value addition & Net Margins (%) in tomato value chain

6.2.3 Marketing Costs, Net Margins and Value-Added Share in Disposal of Mango

The results of the marketing costs, net margins and value-added share of each actor (Inputs suppliers/agro-dealer, mango grower, pre-harvest contractor, commission agents and retailer) in value chains (fragmented and integrated) of mango is displayed in table 6.6.

This shows that the marketing costs was highest being ₹ 261 per quintal at the level of wholesaler followed by ₹ 206, ₹ 184, ₹ 180 and ₹ 152 at the level of commission agent, pre-harvest contractor, retailer and mango grower in integrated value chain, respectively. Whereas the marketing cost borne by mango growers as retailers in the fragmented value chain (chain-I) was ₹ 84, which was about 45 per cent less than the marketing cost borne by the mango growers engaged in the integrated value chain. The value addition (price) stood highest being ₹ 900 per quintal at wholesaler level followed by ₹ 700 at both commission agent and retailer, ₹ 400 at pre-harvest contractor and ₹ 200 at mango grower level in the integrated value chains of mango. The value addition (price) made by the mango growers as retailers in the fragmented value chain was ₹ 500.

The value-added share (as percentage of total value added) for each level of value chain actors engaged in disposal of mango in the study area was estimated and presented in table 6.6. It was depicted that the share of value added was highest being 74 per cent at the level of retailer followed by 71 per cent, 70 per cent, 54 per cent and 24 per cent at the level of wholesaler, commission agent, pre-harvest contractor and mango grower in integrated value chain, respectively. This indicates that marketers involved in each level of value addition in mango value chain were comparatively higher proportionate share as net margin in value added to their level than mango growers. The proportionate share of each value chain actors in the value addition of mango to their level in integrate value chain of mango is illustrated in Figure 6.

It was also found that 32 per cent of the total sample mango growers had adopted both integrated and fragmented value chains for flow of mango in the study area. The net margin of 32 mango growers who flow tomato through a fragmented value chain was found to be 83 per cent, while the net margin of sample mango growers who flowed mango through an integrated value chain was 24 per cent. Thus, mango growers in the fragmented value chain had a higher margin of about 59 per cent as compared to mango growers engaged in the flow of mango in the integrated value chain.

Table 6.6. Marketing costs, margins and value addition for disposal of mango (₹/Qntl.)

S. No.	Particulars/ Performance indicators	Fragmented value chain (Value chain-I)		Integrated value chain (Value chain-II, III & IV)				
		Mango growers (n=32)	Mango growers as retailers	Mango growers	Pre-harvest Contractors	Commission agents	Wholesalers	Retailers
1.	Farm gate price	1000	—	1000				
2.	Purchase price	—	1000	—	800	1200	1900	2800
3.	Selling price	—	1500	1200	1200	1900	2800	3500
4.	Marketing Costs	—	84	152	184	206	261	180
i)	Harvesting charges	—	26	—	10	—	—	—
ii)	Cleaning & grading	—	3	—	6	—	4	—
iii)	Cushion materials	—	3	3	4	—	12	—
iv)	Use of plastic box	—	—	—	25	25	25	—
v)	Transportation charge	—	35	50	35	—	—	50
vi)	Storage charges	—	—	—	—	15	12	—
vii)	Loading and unloading	—	10	10	10	10	—	8
viii)	Mandi charges @7% of sale value	—	—	84	84	133	196	87
ix)	Weighing and others	—	2	—	2	8	4	—
x)	Miscellaneous charges	—	5	5	8	15	8	35
5.	Value addition (Price)	—	500	200	400	700	900	700
6.	Net Margins	—	416	48	216	494	639	520
7.	Net margins (as Percentage of value added)	—	83	24	54	70	71	74

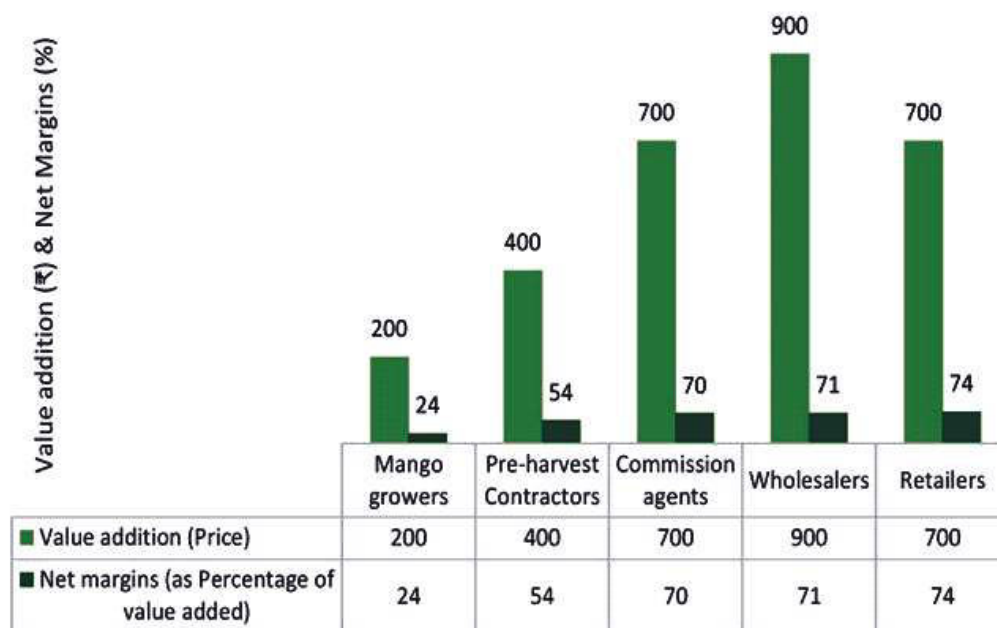


Fig 6. Value addition & Net Margins (%) in mango value chain



7

VALUE CHAIN FINANCE TO HIGH-VALUE AGRICULTURE

In this chapter, we describe the current context of value chain finance to high value agriculture (fish, tomato and mango) in the study area. The transaction processes in the value chain finance for high value agriculture are also discussed. This chapter highlights the level of access of the financial options across the value chain of commodities selected for the study. In this context, the value chain financing models prevalent in the study area were identified.

7.1 Pattern of Value Chain Finance in High-Value Agriculture

It is clear from the Figure 7 that the pattern of value chain financing to high value agriculture (fish, tomato and mango) under direct informal “within the value chain” finance in the study area was found to have a “*buyer-driven financial model*”, as financial facilities were given to the farmers in form of input financing, trade credit, warehouse receipts and factoring by value chain actors (input suppliers, traders, commission agents and wholesalers) for their business requirements. Rutten and Boto (2014) described that the *Buyer-driven form of value chain finance is often in the buyer’s interest to procure a flow of products and use finance as a way of facilitating and/or committing producers, processors and others in the chain to sell to them under specified conditions.*

The input suppliers gave credit to the farmers (fish, tomato and mango) against the farmer’s promise in the form of cash or kind for one to two months to enhance the portfolio of their business and quantum of profit. The trade credit was also given to the farmers (fish, tomato and mango) on similar pattern by traders, commission agents and pre-harvest contractor against the farmer’s promise to deliver products on predetermined conditions.

Similarly, loans were given by the wholesalers of fish as a factoring against the receivables of the fish farmers and produce to be supplied. The wholesalers were also engaged in financing to the tomato growers against warehouse receipts and also on the basis the tomato supply to them.

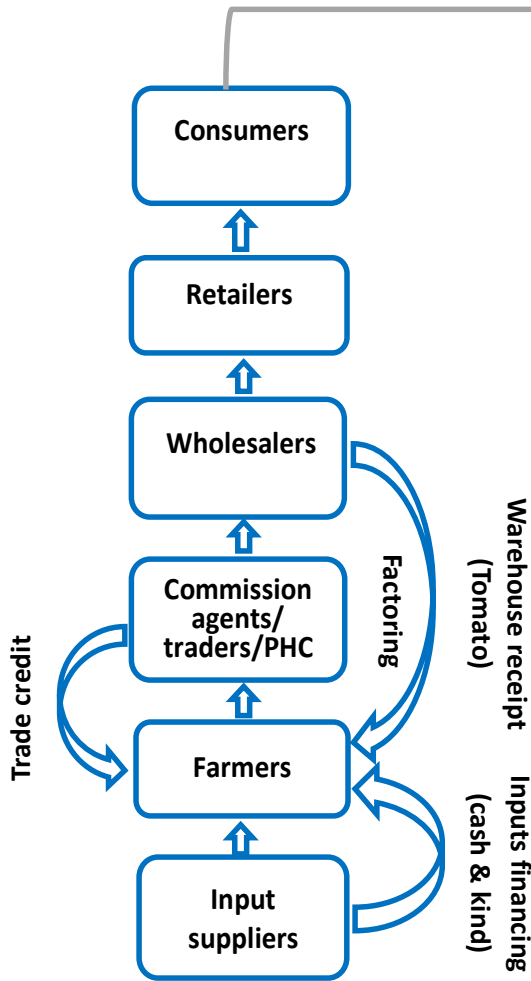


Fig 7. Direct informal “within the value chain” finance (Fish, Tomato and Mango)

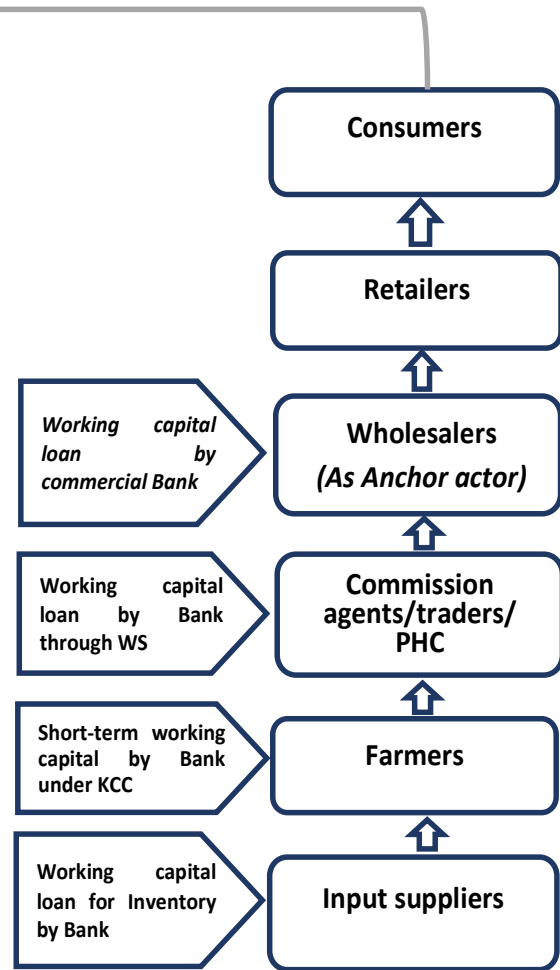


Fig 8. Indirect formal “outside the value chain” finance (Fish, Tomato and Mango)

The trade credit was made available by pre-harvest contractors or traders or commission agents to the farmers through either their surplus fund or wholesalers were taken responsibility as third party for ensuring that the pre-harvest contractors or traders or commission agents repay the individual loans to the bank. Hence, we may say that wholesalers were acted as anchor (creditworthy) value chain actors to the commercial banks to access the indirect formal 'outside the value chain' finance. The anchor value chain actors, with its established relationship with the other actors engaged in the value chain, were taken obligation for guaranteeing that they repaid the individual loans to the financing institution (commercial banks), thereby lessen the bank's costs in analyzing each borrower's credit risk and in monitoring individual loans.

7.2 Access of Value Chain Finance to High-Value Agriculture

The access of direct informal 'within the value chain' finance in the high value agriculture (fish, tomato and mango) in the study area was assessed and presented in table 7.1, 7.2, 7.3 and figure 7 and 8. However, the assessment of access to indirect formal 'outside the value chain' finance (Figure 8) was ignored in the study. These tables (7.1, 7.2 and 7.3) shows that input financing, trade credit and factoring under direct informal 'within the value chain' finance were offered as financial instruments by input suppliers and commission agent-cum-wholesalers to the fish farmers in the fish value chain. Similarly, financial facility under direct informal 'within the value chain' finance was offered by value chain actors to tomato farmers of Jaunpur district and to mango farmers of Varanasi district in the form of input financing and trade credit. The credit against warehouse receipts under direct informal 'within the value chain' finance was available only for tomato farmers in Jaunpur district.

7.2.1 Access of Value Chain Finance in Fish Value Chain

Table 7.1 indicates that 50 per cent of marginal and small farmers, 57 per cent of medium and 67 per cent of large fish farmers were availed the average credit of ₹ 37400, ₹ 83780 and ₹ 104130, respectively, through input financing which was accounted about 28 per cent, 39 per cent and 40 per cent to total operating cost of fish cultivation. Similarly, about 40 per cent of marginal and small, 39 per cent of medium fish farmers got average advanced of ₹ 20460 and ₹ 31720, respectively, as trade credit which was accounted about 15 per cent each to total operating cost of fish cultivation. Apart of this, 35 per cent of

medium and 44 per cent of large farmers had obtained credit of ₹ 29370 and ₹ 52900, respectively, through factoring which was about 14 per cent and 20 per cent to total working cost of fish farming in same category of farms. This indicates that there was positive relationship between size of farm business and level of access of the direct informal 'within the value chain' finance to high value agriculture (fish) in the study area.

7.2.2 Access of Value Chain Finance in Tomato Value Chain

Table 7.2 indicates that 24 per cent of marginal and small tomato growers, 63 per cent of medium and 64 per cent of large tomato growers were availed the average credit of ₹ 5000, ₹ 9200 and ₹ 16200, respectively, through input financing which was accounted about 18 per cent, 27 per cent and 37 per cent to total operating cost of tomato cultivation. Likewise, 12 per cent of medium tomato growers and 21 per cent of large tomato growers were got average advance of ₹ 6480 and ₹ 9630 as trade credit which was accounted about 12 per cent and 21 per cent to total operating cost of tomato cultivation, respectively. Other than this, 36 per cent of large farmers had obtained average credit of ₹ 5690 through warehouse receipts which was about 13 per cent to total operating cost of tomato cultivation. This indicates that there was positive relationship between size of farm business and level of access of the direct informal 'within the value chain' finance to high value agriculture (tomato) in the study area.

7.2.3 Access of Value Chain Finance in Mango Value Chain

It is obvious from the table 7.3 that 58 per cent of marginal and small mango growers, 67 per cent of medium and 75 per cent of large mango growers were availed the average credit of ₹ 6000, ₹ 16300 and ₹ 28300, respectively, through input financing which was accounted about 13 per cent, 28 per cent and 39 per cent to total operating cost of mango cultivation. Correspondingly, about 25 per cent of marginal and small, 29 per cent of medium and 17 per cent of large mango farmers got average advance of ₹ 11000, ₹ 18060 and ₹ 19600 as trade credit which was accounted about 25 per cent, 29 per cent and 17 per cent to total operating cost of mango cultivation, respectively. This indicates that there was positive relationship between size of farm business and level of access of input financing under the direct informal 'within the value chain' finance to the high value agriculture (mango) in the study area.

Table 7.1. Access of value chain finance to high value agriculture (fish)

S. No.	Value chain financing instrument/ transactions	Marginal & small fish farmers			Medium fish farmers			Large fish farmers		
		No of farmers availed the credit	Average quantum of credit (₹)	% to TVC/ acre	No of farmers availed the credit	Average quantum of credit (₹)	% to TVC/ acre	No of farmers availed the credit	Average quantum of credit (₹)	% to TVC/ acre
1.	Input financing by input suppliers	34 (50)	37400	28	13 (57)	83780	39	06 (67)	104130	40
2.	Trade credit by WS/CA	27 (40)	20460	15	9 (39)	31720	15	—	—	—
3.	Factoring by WS	—	—	—	8 (35)	29370	14	04 (44)	52900	20

***Figures in the parentheses indicate percentages to row total.*

Table 7.2. Access of value chain finance to high value agriculture (tomato)

S. No.	Value chain financing instrument/ transactions	Marginal & small growers			Medium growers			Large growers		
		No of farmers availed the credit	Average quantum of credit (₹)	% to TVC/ acre	No of farmers availed the credit	Average quantum of credit (₹)	% to TVC/ acre	No of farmers availed the credit	Average quantum of credit (₹)	% to TVC/ acre
1.	Input financing by input suppliers	14 (24)	5000	18	17 (63)	9200	27	9 (64)	16200	37
2.	Trade credit by WS/traders	—	—	—	2 (12)	6480	19	3 (21)	9630	22
3.	Warehouse receipts	—	—	—	—	—	—	5 (36)	5690	13

***Figures in the parentheses indicate percentages to total.*

Table 7.3. Access of value chain financing to high value agriculture (mango)

S. No.	Value chain financing instrument/ transactions	Marginal & small farmers/growers			Medium farmers/growers			Large farmers/growers		
		No of farmers availed the credit	Average quantum of credit (₹)	% to TVC/ acre	No of farmers availed the credit	Average quantum of credit (₹)	% to TVC/ acre	No of farmers availed the credit	Average quantum of credit (₹)	% to TVC/ acre
1.	Input financing by input suppliers/ PHC	39 (58)	6000	13	14 (67)	16300	28	9 (75)	28300	39
2.	Trade credit by WS/CA	17 (25)	11000	24	6 (29)	18060	31	2 (17)	19600	27

**Figures in the parentheses indicate percentages to total.

CONSTRAINTS IN VALUE CHAIN FINANCING TO HIGH VALUE AGRICULTURE

Value chain finance aims to address perceived constraints and risks by providing innovative ways of delivering financial services to value chain actors involved in the value chains. But constraints to financial flow emerged across the value chain are unique as the product flow in the value chain is used as a carrier to provide financial services. Hence, the constraints that limit the financial flows in the value chain were studied.

Table 8.1. Perceived constraints of respondents in value chain financing to high value agriculture in the study area

Item No.	Constraints	Agreement					Total Score	Mean Score	Remarks
		SA (5)	A (4)	N (3)	DA (2)	SDA (1)			
1.	Unpredictable cash-flows resulting from delays in financial transactions	17.57	33.33	16.22	21.85	11.04	1441	3.25	Influential
2.	Insufficient collateral securities	18.47	22.75	16.22	22.52	20.05	1319	2.97	Not-influential
3.	Complexity arises in recovery of loan given due to prevalent of “Soft” collateral such as guarantees, co-signing etc. in value chain financing,	20.05	22.07	26.13	18.69	13.06	1409	3.17	Influential

4.	Lack of information about potential borrowers which makes screen for reliability, evaluate profitability and risk of default	9.68	20.05	28.60	29.95	11.71	1270	2.86	Not-influential
5.	Value chain loans mare met out the only seasonal requirements	23.65	27.48	18.69	18.24	11.94	1477	3.33	Influential
6.	Value chain actors as a lender acted as profit maker rather enabler of the financial opportunities	11.94	22.97	16.89	30.63	17.57	1248	2.81	Not-influential
7.	Trader credit is venerable to side-selling	9.46	14.41	10.81	44.37	20.95	1097	2.47	Not-influential
8.	Warehouse receipts systems are usually not available to the individual small producer	21.62	31.31	19.14	17.34	10.59	1492	3.36	Influential
9.	No risk mitigation instruments like insurance available	23.42	32.21	11.04	17.34	15.99	1464	3.30	Influential
10.	Low prices at peak periods of harvest/production	15.32	30.86	16.44	20.72	16.67	1365	3.07	Influential
11.	lack of adequate marketing facilities	19.59	23.42	22.07	22.52	12.39	1400	3.15	Influential
12.	Fluctuating production and uncontrolled price risk	17.79	22.30	17.12	27.25	15.54	1330	3.00	Not-influential
13.	Market structure at the farm level is monopolistic (traders / wholesalers control market access)	11.71	22.07	25.68	20.95	19.59	1267	2.85	Not-influential
Overall Mean Score								39.59	Influential

Note : SA-Strongly Agree; A-Agree; N-Neuter; DA- Disagree; SDA-Strongly Disagree. All the figures given in the table except total score and mean score, are the percentage of responsiveness against the statement.

For which, the respondents were asked to express their level of agreement in relation to 13 identified perceived constraints in value chain financing to high value agriculture using 5-point Likert scale as presented in table 8.1.

It is obvious from the table 8.1 that the mean score of the item 1, 3, 5, 8, 9, 10 and 11 were 3.25, 3.17, 3.33, 3.36, 3.30, 3.07 and 3.15 above the neutral mean score (3), respectively and could be considered as influential constraints which hindered financial flow in the value chains of high value agriculture (fish, tomato and mango) in the study area. The mean score of the item 2, 4, 6, 7, 12 and 13 were 2.97, 2.81, 2.81, 2.47, 3 and 2.83 equal to or below the neutral score (3), respectively. This indicates that constraints of these items could not be considered as influential constraints in financial flow in the value chains of high value agriculture (fish, tomato and mango) in the study area. Further, out of 13 items 7 items (1, 3, 5, 8, 9, 10 and 11) of the constraints were influential to limit the financial opportunity to the value chain actors involved in value chain of high value agriculture in the study area. The overall mean score on the scale was 39.59, which was above the overall neutral score ($13 \times 3 = 39$). This indicates that various constraints were faced by value chain actors involved in value chains of high value agriculture for proper financial flow within the value chain of high value agriculture in the study area.



DISCUSSION, CONCLUSIONS AND POLICY SUGGESTIONS

9.1 Discussion

Recently, public policies have been to diversify Indian agriculture with the high value crops. For the expansion of high value agriculture, development of their value chains is crucial which can be strengthened through value chain financing as this enables financial institutions to better evaluate creditworthiness of individuals or firms on the chain; reduce transaction costs; identify risks; analyse competitiveness of the entire chain. But Indian agriculture system along with value chain framework has not been conceived as a main strategy to bring more efficiency, productivity and earnings.

Agricultural value chains in India are subject to high fragmentation and intermediation, resulting in substantial losses in quantity and quality of produce, limited processing capacities, and high price volatility. Despite the expansion in credit flow, the demand for credit in agriculture has not been fully met. The gap between supply and demand has estimated to be widening due to focus on market-oriented high value agriculture and higher quality production for remunerative markets in the established value chains. With this brief backdrop, the current study on value chain finance to high value agriculture (fish, tomato and mango) was undertaken in Eastern Uttar Pradesh as it is the prominent region of the state in terms of area and production of fish, tomato and mango during 2021-22.

The primary survey was conducted in three districts, namely Azamgarh for fish, Jaunpur for tomato and Varanasi for mango during the March-June, 2022. In order to study the value chains of these commodities, farm household data was collected from 100 farmers in each sampled district. Likewise, 44 value chain actors for fish from the markets of district

Azamgarh, 46 value chain actors for tomato from the markets of the district Jaunpur and 54 value chain actors for mango from the district Varanasi selected. Overall, the survey covered 300 farmers and 144 marketers, summing up to a total sample size of 444.

The importance of agricultural value chains in facilitating financial access to the agriculture sector has been recognized in various research studies conducted earlier. The present study analyses the financial penetration of high value agricultural commodities into different value chains, performance of value chains, patterns of value chain finance etc. in various dimensions in order of the identified importance of agricultural value chains for enhancing the flow of agricultural finance. The findings of the present study underscore the cost orientation of high value agricultural commodities, indicating a greater need for consequential credit to high value agriculture. In contrast to the earlier studies of value chain analysis, in this study, the value chains of high value commodities (fish, tomato and mango) both fragmented and integrated value chains, have been analysed on the basis of various performance indices.

The fragmented value chain for disposal of fish was 'Input suppliers – Fish farmers – consumers' accounted about 13 per cent flow of volume of the fresh fish in the study area. Likewise, the fragmented value chains for disposal of tomato and mango were 'Input suppliers/Agro-dealers – Tomato growers – Household consumers' and 'Input suppliers/Agro-dealers – Mango growers – Household consumers, accounted about 14 per cent and 10 per cent of disposal of marketable surplus for tomato and mango in the study area, respectively. The fragmented value chain provides significant opportunities for the inflow of external finance into the value chain. The findings of the study show that farmers of the fragmented value chains of high value agriculture (fish, tomato and mango) had a higher proportionate share in the value addition (price) of the commodities in comparison to farmers engaged in the integrated value chains due to lower marketing cost incurred in the disposal of fish, tomato and mango under fragmented value chains. Despite this, the farmers in fragmented value chains were also to be connected with integrated value chains of the high valued commodities as they had availed only limited credit under Kisan Credit Card scheme as external finance whereas in the integrated value chain, they were able to meet their credit and non-credit requirements.

The integrated value chains for disposal of fish were '*Input suppliers – Fish farmers – Commission agents-cum-wholesalers – Retailers – Consumers*' and '*Input suppliers – Fish farmers – Traders – Commission agents-cum-wholesalers – Retailers – Consumers*' accounted about 18 per cent and 69 per cent flow of volume of the fresh fish in the study area, respectively. Similarly, the integrated value chains for disposal of tomato were '*Tomato*

growers – Cold storages – Wholesalers – Retailers – Consumers’ and *‘Tomato growers – Commission agents – Wholesalers – Retailers – Consumers*’ accounted about 6 per cent and 80 per cent flow of volume of the fresh tomato in the study area, respectively. Moreover, the integrated value chains for the disposal of mangoes were *‘Input suppliers/Agro-dealersMango growers – Pre-harvest contractors – Consumers*’; *‘Input suppliers/Agro-dealers – Mango growers – Commission agents – Retailers – Consumers*’ and *‘Input suppliers/Agro-dealers – Mango growers – Commission agents – Wholesalers – Retailers – Consumers*’ accounted about 4 per cent, 2 per cent and 84 per cent of surplus mangoes, respectively.

The involvement of farmers in the integrated value chains of the high valued commodities was proportionally high in comparison to fragmented value chain and accounted 57 per cent of farmers for fish, 73 per cent of farmers of tomato and 68 per cent of farmers of mango. Accordingly, the quantitative flow of high valued commodities (fish, tomato and mango) in the value chains was also high. Which indicates that the business relationships of the farmers with their consequent value chain actors were found to protect their credit and secure markets.

Moreover, the results of the study reveal that chain participants were mobilise surplus fund to those who need financial assistance. Further, wholesalers were acted as anchor chain actor to financial institutions to access the indirect formal ‘outside the value chain’ finance. Hence, it may be concluded that the finance into the value chains of high value agriculture was circulated through a product commitment relationship established between the chain participants. Under which the downstream actors (wholesalers, Commission agents, traders, preharvest contractors) of the chain financed to the upstream actors (producers) from their surplus funds or by external finance received from financial institutions through the anchor actors.

Barriers limiting the financial opportunities of various actors in the value chain were identified by Likert scale. The constraints found in high agricultural value chains that limit the financial opportunities of value chain actors were (i) Unpredictable cash-flows resulting from delays in financial transactions, (ii) Complexity arises in recovery of loan given due to prevalent of “Soft” collateral such as guarantees, co-signing etc. in value chain financing, (iii) Value chain loans mare met out the only seasonal requirements, (iv) Warehouse receipts systems are usually not available to the individual small producer, (v) No risk mitigation instruments like insurance available, (vi) Low prices at peak periods of harvest/production and (vii) lack of adequate marketing facilities as these constraints had secured mean score more than neutral mean score (3).

9.2 Conclusions

Most of previous study related to agricultural finance were concentrated towards enhancement of flow of credit towards the agriculture sector, addressed the disparity in the quantum of credit among the enterprises, access of credit to weaker sections of society including small and marginal farmers but overlook the role of the value chain in promoting the deepening of rural finance. Unlike previous studies, this study assesses the performance of fragmented and integrated value chains of high value agriculture (fish, tomato and mango) to assess the potential for internal and external finance to penetrate value chains of these commodities with proper financial needle. This study suggested that there are need to developed producer-driven value chain financing model as alternative of the buyer-driven value chain financing model was prevalent for financing to the value chains of fish, tomato and mango in the study by promoting farmers organizations as a long terms financing strategies of financing institutions. However, financing agencies should be identified the anchor actors of the value chains to pinup the financial dose in the value chain so that financial deepening to be ensured. The study also evaluates barriers in access to finance in the agriculture value chain.

9.3 Policy Suggestions

The results of the study offer useful insights to the policy makers and planners for improving the efficiency of prevailing value chains of high value agriculture in Eastern Uttar Pradesh through value chain financing. Nevertheless, the following policy recommendations were made to enhance the capability and efficiency of the value chains and to make the sector more competitive :

First, cultivation of high value agriculture in the study area was capital intensive as evident from the results of the study that the cost per unit for cultivating fish, tomato and mango was high. Feed cost in fish farming while labour cost in tomato and mango were identified as major costs. Therefore, there is a need that the lending financial institutions should design '*activity oriented*' financial products to increase financial access in the fish value chain. Also, due to high labour cost in mango and tomato cultivation, it can be reduced by the intervention of farm mechanization and new technologies, but for these financial institutions will have to increase financial access to adopt innovation.

Second, everyone who contributes in a value chain adds value as the product passages from the beginning of the chain towards the consumer. In exchange for adding this value, all contributors receive a margin. The results of the study shows that marketers involved on each level of value addition in value chain of fish, tomato and mangoes were received

comparatively higher proportionate share as net margin in value added to their level than producers of these commodities. Which indicates that the producers of these commodities were not compete with increased demand for fish, tomato and mango at the market place. Hence, farmers need to be well organized to compete in an increasingly demanding marketplace. For this, Government should promote the cooperative institutions and farmers-producers organization in the study area to capture the demand along the value chains.

Third, the Government through cooperatives, producer unions and self-help groups should promote the producer-driven value chain financing model as alternative of the buyer-driven value chain financing model was prevalent for financing to the value chains of fish, tomato and mango in the study area to gain access to remunerative or niche markets, to reduce marketing costs, and to improve their bargaining power. However, financing agencies may enhance their finance to agriculture under buyer driven model by recognizing the anchor actors of the value chains.

Lastly, majority of the actors along the value chains indicated the need for finance to create infrastructure facilities to enhance their business opportunities. Hence, the financing institutions and government should come forward to provide financial support as indirect formal 'outside the value chain' finance in addition to technical support particularly small and marginal farmers involved in the value chain of high value agriculture.



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