IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Vegetable Value Chains In Punjab: A Review

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Abstract: Vegetables can add to the change of our food frameworks towards more healthy edibles and at the same time generating value and employment. By producing vegetables of different kinds the small and marginal farmers are gaining considerable income in the entire year. After China, India is the second largest producer of fruits and vegetables in the world. The Agricultural economy of India is majorly driven through the dominant sector of horticulture. There is nearly 33percent growth increase in its percentage of share. The present study focuses on reviewing the different value chains of vegetables in the state of Punjab in India with the objective of identifying various value chain actors and their respective roles, the value chain map of the value chain intermediaries. Secondary data has been used for the completion of the objectives of the study. The entire data will be collected through evaluation of numerous research articles abstracts, finding and concluding results for the scanning of vegetables value chain literature. This review study focuses on the complete picture of existing constraints, challenges, and opportunities, factors affecting vegetables value chains, different market channels, market margins, various inefficiencies in the value chain, and value addition in each stage of the value chain and marketing efficiencies of the various market channels as well as individual share of every value chain actor of diverse food value chains.

Index Terms - Value chain intermediaries, Market channels, Market efficiency, Marketing cost, Marketing margins.

I. INTRODUCTION

In underdeveloped and economically developed countries, high growth rate prospects are there in the production of horticulture produce. To make the availability of domestic food and for diversification of income sources, there is development in horticultural production premises. Horticulture affects and improves human health, farmer household income, and economic and social advancement. India, with its wide variability of climate and soil, is highly favorable for growing a large number of horticultural crops. During the times of 1940s to 1980s, cereals were the main crop in India, but in the later 1980s, there were developments in the horticulture sector in India. There is rapid increase in the diversification of horticulture crops due to economic reforms and policies of 1990s (Chand *et al* 2008).

The main focus of new agricultural policy resolution 1992 was also towards processing, marketing and storage, development of rain fed and irrigated horticulture (Government of India, 1993).A central scheme was launched in 2005-06 to promote the holistic growth of the horticulture sector through an area-based regional strategy by National Horticulture Mission.

Promotion of Agricultural and horticultural commodities export was the main highlight in the foreign trade policy in 2004–09. The horticultural sector contributed 28percent of agricultural GDP and 54percent of agricultural exports in India in 2007–08.About 175 kind of vegetable are grown in India and from the total verities, 82 are field vegetables and 41 are root crops.

As major contribution from horticulture crops in the agriculture sector, there is possibility of achievement of national goal of 4.0percent growth in agriculture (Agarwal, 2016). India is the second largest producer, after China, in horticulture sector by producing 13percent fruits and 21percent vegetables from the total global production of fruits and vegetables as per statistics given by National Horticulture Development Board (Horticultural Statistics at a Glance, 2017).

Cold storage facilities are available only for 10percent of the produce. In spite of abundant agricultural produce, India rank 10 in the export of food products with processing levels in fruits and vegetable sector at around 2percent only (Viswanadham 2006). From the list of main consumable foods groups, the highly wasted food groups were cereals, fruits and vegetables in the EU Caldeira (2019).

By producing vegetables of different kinds the small and marginal farmers are gaining considerable income in the entire year. Vegetable production in India has increased from 93.85 million tonnes in (2000-2001) to 191.77 million tonnes in (2019-20). The vegetable production in 2017-18 was 184.39 million tonnes, but increased to 187.47 million tonnes in 2018-19 which shows around 1.6 percent increase (Anonymous1, 2019). The area under the vegetables was 10.259 million ha in 2017-18, and in 2018-19 it was 10.43 million ha which also revealed the marginal increase in the vegetable production area. (Anonymous2, 2019).

In India, out of the total horticulture crop production (from 2012-18) the vegetable's contribution is steadily high i.e. (59-61percent) (Anonymous, 2018).In Punjab, area covered by vegetables plantation for 2018-19 was 273.25('000 Ha) and production of vegetables was 5442.22('000 Ha). (Anonymous3, 2019)

Top two vegetables in Punjab are Peas and potato according to production criteria (Anonymous3, 2019; Anonymous4, 2019) Production of potatoes in districts Jalandhar, Hoshiarpur, Kapurthala, Bathinda was 2716.33('000 MT), whereas production of peas in Hoshiarpur, SBS Nagar, Patiala, Amritsar, TarnTaran was 405.23('000 MT). In Punjab, the farmer sold potatoes 90percent to wholesalers (commission agents), 9percent was purchased by Itinerant merchant/local traders and less than 1 percent to retailers and consumer considered as main value chain actors for final consumption of the potato.

In case of Peas in Punjab, the first actor after farmer is the "wholesaler", second is "local trader", third is "retailer" and then final actor is "consumer". From the total production of Peas, the wholesaler purchased 60percent produce, 36 percent produce is sold to the local trader and produce of about 3percent is sold to the retailers (through the commission agent). The farmer sold less than 1percent out of the total produce to the consumers. (Sidhu *et al*, 2009)

II. RESEARCH METHODOLOGY

Secondary sources are used for the analysis of value chain of the vegetables in the study. This study is solely based on the Secondary data. The secondary data was collected from the previous research studies and papers that discussed about the different value chains, middlemen in the value chains, their role and importance for value addition in the vegetable produce, market inefficiencies, problems and challenges faced by the all value chain actors. The various abstracts, findings and concluding results of the research papers were studied to differentiate appropriate research papers for the Scanning of vegetables value chain literature. The purposes, tools and methods of the research papers are being scrutinized and rejected before reviewing all parts of research papers to conclude the best results from each paper.

III. RESULTS AND DISCUSSION

Meaning and definitions of Value chain and Agricultural Value chain

In 1980s, Michael Porter gave the value chain approach and expressed his views in the book "Competitive Advantage: Creating and Sustaining Superior Performance" (1985). A process in which various actors from input suppliers to the buyers that are engaged to bring a product from production/origination to its final utilization and consumption. (Kaplinsky and Morris, 2001)

Value chain stands for the addition of value to the product as it passes through the whole chain in which various actors are engaged. The addition in value is due to different activities involved in it for instance cleaning, grading, packaging, transporting, storing, and processing etc. (Anandajayasekeram and Berhanu, 2009).

The producers and buyers share a partnership where the loyalty of the customer strengthens the bond with a huge change in the agricultural business sector and the change in international trade patterns (urbanization, change in consumer behavior, supermarket chains, advancement in retailing) the food value chain research has developed. (Dolan and Humphrey, 2000; Ahumada and Villalobos, 2009; Gereffi and Christian, 2010; Lee, *et al*, 2010).

Value chain consists of two major factors- value and chain. Value stands for the value "a product adds to the value chain analysis". In agricultural products, value of the finished good depends on food safety and food functionality. On the other hand, chain stands for the supply chain that is directly or indirectly involved in the life cycle of a product. (Hawkes and Ruel, 2011)

The value chain of agricultural sector involves three or more than three actors among processor, distributor, broker, wholesaler, retailer, consumer, and these actors who work together in finding objectives while sharing the risk, benefits, time and energy for the working of relationships. Value chain is classified into three important levels: value chain actors (persons or workers that are directly dealing with a product), Value chain supporters (actors that add value to the product without dealing with the product directly), and Value chain influencers (who regulate the framework, make policies or infrastructure) (Bammann, 2007).

The agricultural value chain consists of wide range of activities and actors that are involved in transferring input suppliers to producer's fields and finally to the consumer. Every process in the chain is linked to another for forming a feasible chain. (Miller and Jones, 2010)

Schmitz (2005) laid stress that value chain is required to make everyone understand the importance of its each and every actor that contributes in a particular chain from production to distribution. Value chain tells which aspect adds value and which are weaker in return so that improvement can be done.

Ganguly (2011) laid stress on developing agricultural value chain for local as well as export market as it is considered a powerful implement for poverty depletion. He has a view that farmers should leave the conventional crops and produce those commodities that have higher capability for value addition. With regard to this, if farmers are given the access to processing and distribution facility, it will increase the final product value.

Market Intermediareies /Market Channels/ Market Efficiency

Bhardwaj (2011) found the number of Market intermediaries in tomato value chains in Uttarakhand who took the major share of consumer rupee are the foremost reason for the less prices paid to farmers and more prices to be paid by the consumers. Farmers lack knowledge regarding preferences and specific needs of the consumers, forecasts of demand, trend of prices in the market, sources of accessibility of credit and lack of infrastructure constraints .(facilities of cold storages and processing facilities also.)

Suryevanshi (2006) carried out a study to discover marketing routes for calculate the price elasticity, marketing margin and marketing cost. It identified that 80percent tomato was sold through producer-commission agent cum wholesaler-retailer-consumer. In channel-I the marketing cost was the highest i.e. Rs 187.45, whereas in producer- consumer channel it was lowest as RS 55.40. The wholesaler enjoys less profit as compared to the retailers. Channel –II should be selected to keep safe the interest of tomato producers whereas channel-I should. Marketing efficiency was highest as 9.70percent in producer- consumer channel. For better profit margins when produce is small in quantity.

Dastagiri and Chand (2013) The study discussed about the various intermediaries involved, different channels followed for the marketing of horticulture crops, price spread and marketing efficiency in Punjab, Tamil Nadu, Manipur, Rajasthan, West Bengal, Andhra Pradesh, and Karnataka. In Punjab and Tamil Nadu direct marketing has been practiced for marketing of vegetables. Marketing cost, marketing margins, price spread was highest in direct marketing channel i.e. producer to consumer, as compare to other marketing channels i.e. producer- wholesaler-retailer-consumer, producer-retailer-consumer being followed by other states under study. Hence, government policies should promote direct marketing models for horticultural marketing.

Choi (2008) discussed about the analysis of market channels performance and market co integration performance and price spread among the green gram, pigeon pea and chick pea. From all of the intermediaries, producers were on the first to received highest marketing margins, then on second there were

exporters. The two main factors are there i.e. efficient markets and efficient price system considered for improvements in market integration.

Sidhu *et al* (2011) focused on green peas which was about 18.45 thousand Hectares and with the production of 1.11 lakh tonnes in 2007-08 of Punjab State. The maximum produce was sold in wholesale market. Three types of supply chains were found that are producer – wholesaler-retailer- consumer (supply chain I), producer-retailer-consumer (supply chain II) and producer-consumer (supply chain III). The most efficient supply chain was supply chain III because of highest producer share was there which results in maximum market efficiency that was 14.83. As there was absence of wholesaler in supply chain II results in higher retailer margin. Approximately 94 percent of consumer price was received by the producer where as 6 percent was expense. The major explanatory variables that was affecting the marketing efficiency were marketing margins and costs.

Sidhu *et al* (2010) conducted the study in Patiala district of Punjab by taking a sample of 50 vegetable producers. Rs 49563/ha and Rs 34840/ha was the total cultivation cost of onion and cauliflower respectively whereas the n2010et return for onion was higher (Rs 74597/Ha) as compared to the cauliflower (Rs 38072/Ha). Through modernized vegetables market system and organized retail chain, the efficiency of the market channels can be enhanced. With approximate 90percent price change, the highest elasticity of price transmission in onion was observed in Ludhiana and Patiala. There is need for modern facilities to be introduced for increasing the efficiency of market channels that are refrigeration, proper grading & standardization and efficient means of transportation.

Siddh *et al* (2018) created the performance measure model identified that there is positive relationship between producer performance and supplier, processor and distributor performance by analyzing Indian food industry and using survey study, structural equation modelling(SEM), exploratory factor analysis with Varimax rotation.

PRICE MARGINS AND PRICE SHARE OF VALUE CHAIN INTERMEDIARIES

Baruah *et al* (2000) studied marketing margin, price spread and efficiency of market of cauliflower in Barpeta province of Assam. The study revealed that under financial problems and storing problems, the farmer sells their product to intermediaries. There were two channels, Channel 1 consists of Producer, Primary wholesaler, Secondary Wholesaler, Retailer, Customer. It was seen that price spread of consumer's rupee was 60.38percent in channel1. And channel 2 consists of producer, retailer and consumer and seen that marketing efficiency was higher in channel 2.

Kumar *et al* (2005) examined the variability and stability of vegetable crop arrivals (cabbage, cauliflower, tomato, and peas) and prices in four significant metropolitan areas. Market arrivals and wholesale prices of various agricultural crops were gathered between 1990 and 2001 from the Azadpur market in Delhi and the Agricultural and Processed Food Products Export Development Authority (APEDA), New Delhi. The results of the study have confirmed that there was a negative link between prices and market arrivals over the course of the months and years in Delhi, Mumbai, Bangalore, and Kolkata. The study primarily demonstrates a negative correlation between market arrivals and prices of vegetable crop prices, although in some instances, a positive correlation was also discovered.

Ghoshal *et al* (2011) worked on value chain analysis of Paddy in Andhra Pradesh. The study puts light on the price margin of different actors that are concerned in the Total Paddy value chain analysis. The different shares are as farmer (33percent), Wholesaler (150percent), Miller (24percent), and Retailer (28percent). It was concluded that when paddy was directly sold in the local market. The farmers were losing it 17percent profit by selling his produce right away to meet his needs.

Dorren*et al* (2005) reported rice value chain analysis in Thailand. The study shows the price breakdown of different types of rice, working margin from farmer to exporter. It identified the causes of uncertainty in the prices of the price. It was found that that middle actors enjoy the increased prices of rice and the farmer faced constraints like lack of capital and storage facilities. Through this report it is cleared that the tariff barriers give no advantage to the processing industry.

Aparna*et al*(2013) conducted a study on retailing of vegetables, consumer point of view and a farmer retailer in Hyderabad city of India. They counted the import of the upcoming supermarkets to the farmer while calculating the margin and cost of three vegetables in marketing i.e., tomato, brinjal and lady finger. Farmer received more net price in super market channel as compared to the traditional channel. Marketing cost and margin was higher in traditional channel. While the marketing efficiency of super market channel was more as compare to the traditional channel.

Kumar *et al* (2010) worked on the value chain analysis of coconut in Orissa. In this report it is seen that the value share of product appears like 59.47percent farmer's share, 19.64percent for vendors and 20.89percent for aggregators. The share of the farmers is high in the market with respect to the other actors involved.

Reddy *et al* (2010) worked on value chain and retailing of fresh vegetables and fruit in Andhra Pradesh (undivided). The study showed that in modern retailing the figure of players was less as farmer rank first in total gross value percentage than comes the middleman, wholesaler. On the other hand, the traditional retailing (vertical distribution) in which 19.8percent goes to village merchant, 14.3percent to middleman, 15.3percent to wholesaler, 12.0percent to commission agent, 16.8percent to rythu bazars, pending 10.8percentto traditional retailers.

Gilbert (2008) worked on value chain analysis of the cocoa and coffee sectors. It aimed to solve the problem of coffee and chocolate prices in the retail that are in the declining ratio over past 30 years. Author concluded that the global chain analysis was not successful in describing the value shares and hence the producer's share of the retail was not a useful criterion. In the end the production cost at starting have declined and processing marketing as well as distribution cost have increased over the passage of time.

Gilbert (2008) studied and found the evolution in the retail and producer market is irrelevant and as the result of monopoly power exercise there is no proof of fall in the shares of the producer.

Ahmad Javeed (2019) discussed about marketing margins, marketing surplus, post-harvest losses and the potential problems of carrot growers, commission agents, retailers and carrot consumers in the Faisalabad district of Pakistan. Regression Analysis was used for estimating the various factors affecting consumer demand and producer supply of carrot. Lack of removal mechanism of the waste material, improper sanitation and sewerage services, non-existence of shed facilities in the market are common problems that needs to be provided by the market committee. Usage of bad transportation system and inadequate packing material also become reason for the spoilage of carrot.

Jain and Kumar (2020) estimated three different kinds of channels and difference of the marketing cost, marketing margin and price spread between these major. Producer, village trader, wholesaler cum commission agent, retailer and consumer were the main intermediaries identified in the production and marketing of green chilli in Jaipur District of Rajasthan. The study revealed the problems faced by producers of the green chilli and also discuss constraints in the marketing of green chilli. Producer share in consumer's rupee in village, regulated market and direct marketing was 69.68percent, 74.08percent and 100percent respectively.

Siddique and Rudra (2017) choose150 farmers were chosen from 6 villages of District Ranchi and focused that different type of supply chains were used by them for selling vegetables like okra, potato, onion, cauliflower and tomato. The study concluded that area under cultivation is directly associated with the level of production, consumption and marketed surplus at farm level. The producer fetches remunerated price of cauliflower through cooperative arrangement of transport that reduces the marketing cost. The opportunity for the producers of vegetables to increase their income was to reduce the gap between produce by adopting the improved/hybrid seed. (Ranchi, Jharkhand)

Vegetables Processing

Kaur *et al* (2019) revealed that there are three kinds of processing found for adding value to the agricultural products. First is Post harvest primary processing i.e. processing relevant basically to fruits and vegetables and small value is added in this which includes cleaning, packaging and sizing only. Second type is Post Harvest secondary processing which is related to the endlessly grains items i.e. wheat, maize etc. and includes simple processing, branding and packaging. And last is tertiary processing in which products are processed and made after the primary and secondary processing.

Nogueira *et al*(2020) identified the number of factors which generate the wastage of fruit and vegetables that are quality of the equipments plus its maintenance used for processing and absence of the extraordinary training of the manipulators also. Equipment is essential to increase and improve the productivity in food processing, especially fruits and vegetables.

Singh and Bansal (2013) investigated the challenges and opportunities facing the food processing sector as it responds to cyclical changes in profit, output, and exports. The fast changes in the cost of transportation, distribution, and storage had a significant impact on the profitability of the milk processing industry. Due to changes in market supply and production use, seasonality and perishability also have an impact on profitability. The most significant and least significant issues that the food processing industries faced were poor infrastructure, high investment, high tax rates, lack of customer awareness of processed products, perishable nature of food items, and lack of distribution.

Diaz-Ruiz (2019) identified 48 Different preventive measures for reduction of wastage of food along with the food supply chain through different stages examined.

Gunarathna *et al* (2020) identified that lack of appropriate packaging, lack of suitable harvesting practices, mishandling, and malpractices at the time of transportation as the main reasons for the postharvest losses with respect to the supply chain of the vegetables.

Major Challenges and Constraints in the Value Chain of Vegetables

Regmi (2013) analyzed the value chain of vegetables in Palpa district of Nepal and collected data by interviewing the value chain actors (input suppliers, farmers, traders and consumers), focus group discussion and meeting with government bodies. From his research, he identified seven different vegetable marketing channels. The study has revealed that tomato, green chilli and the cauliflower are the high value and high market demanded commodity in Palpa so there is higher scope for the cultivation of these crops mainly in rainy season. The major hindrance in marketing is lack of unity among value chain players (farmers, wholesalers, and retailers), trust issue between MPC and farmers and lack of operation guidelines. The research has more focused on opportunities and constraint of vegetable farmers, but has not clearly discussed on market margins and producers share on consumer price.

Anonymous (2011) conducted study in Nepal on value chain of off-season vegetables which identified some challenges faced by subsector like unavailability of quality planting materials, lack of information among the producers of the right usage of fertilizers and pesticides moreover as poor soil fertility management, lack of irrigation facilities, labour shortage, postharvest loss due the perishable nature of vegetables, limited access to reliable market information, unorganized market centre, limited collection centres, and lack of proper packaging and transportation facilities. The study recommended short-term and future infrastructural and institutional innovation to scale back the above challenges.

Karyani *et al* (2016) used the descriptive analysis and value stream mapping in the West Java and various financial problems of mango farmers was discussed. Contracts, agreements and security of credits were identified as important pillars of the financial scheme which was provided by sponsor institution

Emongor *et al* (2009) worked on the Rice value chain in Kenya with reference to producers. It showed that farmers were not using inputs accurately as high costs was involved. The middlemen from producers to consumers in Kenya were service providers, logistic centres, Industries and traders. The main drawbacks of Paddy farming in Kenya were 31.1percent lack of credit, 20.3percent poor water supply, 12.2percent poor irrigation infrastructure, 5.4percent diseases, and 5.4percent poor prices of paddy.

Negi and Anand (2019) identified a number of different reasons/factors for inefficiencies of high cost structure, poor quality and high lead time in the supply chain of mango at wholesale stage in India were found to be operational issues, Labour, resources, infrastructure in three major factor differently and identified using factor analysis. And for improving the efficiency in the supply chain various measures was discussed.

Giziew (2014) found that there are various production and marketing constraints in the tomato and onion value chains independently for both male and female in Ethiopia. In the review, Constraints faced by farmers and traders in the value chains of onion and tomato was studied with respect to Socio-economic, demographic and institutional factors to smooth out gender viewpoint in Ethiopia.

PRACTICES/ STRATEGIES FOR IMPROVEMENT

Kaplinsky and Morris (2001) examined the value chain of vegetables in Hatay Province of South East Turkey. They concluded that value chain is a bridge that joints the two opposite ends of production and consumption zones. Marketing operation in that province was based on evolution of the private trader's system. In their point of view a specific strategy was needed for betterment of adaptation to market charges from grower to merchant. They put forward the notion of cooperatives, associations and unions at production level for the enlargement of vegetable value chain.

Bammann (2007) concluded that value chain concept was helpful in finding and formulating of the projects additionally developing strategies for upgrading agricultural and rural growth. He said that cooperation between government and private agencies offered substantial prospective for implementing value chain concept, which focused at rise in income as well as employment through improved farming. He had a vision that value chain could be employed to various situations and for contrasting the group including youth and women's group.

Kalidas *et al* (2014) laid emphasis on adopting global best practices in every segment from storage to value added service by organized player taking part in it causing benefit to the farmer as well as the customer.

Digal (2005) suggested that making improvements in the system of production and marketing of vegetables, there is need of quality grading system in the vegetable industry. The major attributes of the adequate quality grading system i.e. quality grades and standards was discussed to improve the efficiency in the food chain from its production to marketing of vegetables.

Sharma *et al*(2006) emphasized on the 'strategies' at various levels like post harvesting, harvesting and production level according to the Indian plot as well as enhancing the availability of quality vegetables, fruits and processing units in the market. There is need for terminal markets so as to prevent mishandling, influx caused by sunlight and hygiene of compound causes drastic reduction in the price of the horticulture produce.

CONCLUSION

One of the potential sources of income and a dependable practice for reducing the persistent poverty and malnutrition in India is vegetable production. It contributes to better living by offering dependable work and income to the nation's marginal farmers and their families during the course of the year. Seasonal surpluses, perishability and shortages affect the vegetables which are to be marketed, which in turn influences how farmers, dealers, and consumers behave in the market. In order to investigate the boundaries of vegetable production from input supply to consumer, the value chain approach is considered as a unique technique. Value chain is the process in which various actors from input suppliers to the buyers that are engaged to bring a product from production/origination to its final utilization and consumption. The national as well as international research studies on the value chains of vegetables and other food was intensely observed in this paper.

This review study outlines the market factors that affect vegetable supply and the opportunities and limitations of the value chain for vegetables. The information provided in this study paves the way for the development of policies and initiatives aimed at raising the per capita income of farmers and helpful to diminish the various problems of the value chain actors i.e. wholesalers, retailers, processors and consumers as well as creating opportunities for agribusiness, different practitioners in the wholesale, and retail sectors.

In-depth details are provided in the study addressing potential for growth and information on numerous aspects affecting the value chain of vegetables. Different market channels, market margins, various inefficiencies in the value chain, and value addition in each stage of the value chain and marketing efficiencies of the variousmarket channels as well as individual share of every value chain actor of diverse food value chains in the different states of India has been defined profoundly.

ACKNOWLEDGMENT

Foremost, I would like to express my sincere gratitude wish to my advisor Dr.Sukhmani for her encouragement, continues support and guidance which make possible to complete my research paper. I also thank ICCSR, New Delhi for accepting the research proposal of my PHD Programme and also providing financial assistance for my research studies.

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