मूल्य संवर्धन विकास के लिए उद्यमी पर्यावरण का महत्वपूर्ण विश्लेषण

Critical Analysis of Entrepreneurial Environment for Value Chain Development

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Critical Analysis of Entrepreneurial Environment for Value Chain Development

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IN

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This is to certify that the thesis entitled **"Critical Analysis of Entrepreneurial Environment for Value Chain Development"** submitted to the Faculty of the Post-Graduate School, Indian Agricultural Research Institute, New Delhi, in partial fulfilment of the requirements for the award of **Doctor of Philosophy** in **Agricultural Extension,** embodies the results of bona fide research work carried out by **Ms. Shruti, Roll No.-10575,** under my guidance and supervision, and that no part of this thesis has been submitted for any other degree or diploma.

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Dedicated to My Family, Teachers, Friends and Farmers……..

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ABBREVIATIONS

AM	Arithmetic Mean
ANOVA	Analysis of Variance
BCR	Benefit-Cost Ratio
BEP	Break Even Point
CCRF	Cumulative Cube Root Frequency
CIAE	Central Institute for Agricultural Engineering
CIAT	International Center for Tropical Agriculture
CP	Consumer Price
CPRI	Center for Potato Research Institute
DFID	Department for International Development
EPA	Evaluative Potency Activity
FAO	Food Agricultural Organization
GDP	Gross Domestic Product
GPR	Gross Price Received
GST	Goods and Services Tax
HAC	Hierarchical Agglomerative Clustering
IARI	Indian Agricultural Research Institute
I-CVI	Content Validity Index for item
IIED	International Institute for Environment and Development
IISR	Indian Institute of Soybean Research
ILO	International Labour Organization
KCC	*Kishan* Credit Card
KVK	Krishi Vigyan Kendra
MC	Marketing Cost
MEI	Marketing Efficiency Index
MM	Marketing Margin
MoA&FW	Ministry of Agriculture and Farmers' Welfare
MoFPI	Ministry of Food Processing Industries
NPR	Net Price Received
NSIC	National Small Industrial Corporation
PCA	Principal Component Analysis
PIB	Press Information Bureau
RAU	Rajendra Prasad Agricultural University
S-CVI	Content Validity Index for overall scale
SD	Standard Deviation
SLM	Single Line Method
SOPA	Soybean Processing Association of India
TNA	Training Need Assessment
UNIDO	United Nations Industrial Development Organization
VAC	Value Addition Cost
VCD	Value Chain Development

Chapter-1

INTRODUCTION

"The discovery of agriculture was the first big step toward a civilized life".

Arthur Keith

Agriculture is the biggest private enterprise in India in over 600,000 villages and also 54.6 per cent of the population engaged in agriculture and allied activities (census 2011). Globally, India ranks second in agricultural production reveals agriculture based economy of our country. There was record food grain production of 275.68 million tonnes in 2016-17 which is higher by 10.64 million tonnes (4.01%) than the previous record production of food grain of 265.04 million tonnes achieved during 2013-14 (PIB, MoA&FW, 2017). In 2015-16, agriculture contributed 17.4 per cent to Indian Gross Domestic Product (GDP) as compared to 18.3 per cent in 2013-14. The final estimate of 2016-17, showed horticulture production of 300.6 million tonnes which is 24.92 mt more than food grain production. Within horticulture, vegetable production and fruit production was estimated at 181 mt and 95 mt respectively in 2017-18.

However, a major portion of the produce goes wasted. The study conducted by Nanda *et al.* 2012 showed that 3.9-6.0 % cereals, 4.3-6.1 % pulses and 2.8- 10.1 % oilseeds were lost during harvest, post-harvest operations, handling and storage in India. Out of the total production of fruits and vegetables, nearly 76 per cent is consumed in fresh form, while wastage and losses account for 20 to 22 per cent. Only 2 per cent of vegetable production and 4 per cent of fruit production are being processed (MoFPI, 2016). This is in sharp contrast to the extent of processing of fruits in several other developing countries such as Brazil (70 per cent), Malaysia (83 per cent), Philippines (78 per cent) and Thailand (30 per cent). Now India is self-sufficient in food production but agriculture sector is constrained by low productivity, huge post-harvest losses especially horticultural crops, inadequate cold chain, inefficient value chain etc. Therefore, there is urgent call for focusing on post-harvest management and processing of agricultural produce in order to reduce the wastage and increase self-life of produce.

According to Ministry of Food Processing India (MoFPI), the food processing industry is contributing significantly to Indian economy, as it contributes

9 % and 11% of GDP in Manufacturing and Agriculture sector respectively. It was reported that annual growth rate of food processing industries sector was 7 percent compared to agriculture (4.90 %) and manufacturing (8.06 %). The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales. The food processing industry is one of the labour intensive industries, constituting 12.77 % of employment generated in all manufacturing factories registered under Factories Act 1948. However, there are several challenges facing this sector like supply chain infra gap, poor linkage of producer and processor, seasonality of operation and low capacity utilization, lack of focus on quality and safety standards etc. Therefore, the development and promotion of efficient value chain is critical for the accelerated development of food processing and agriculture sector. Further, it is essential to strengthen forward-backward linkages of agricultural sector with technology, supporting food processing industry to match soil to seed and product to market. In this context, it is pertinent to focus on post production and productivity, diversification of agriculture, developing farmers' capacity for processing and linking them with market and other supporting institutions.

Value chain development in agricultural sector

The development and promotion of an efficient value chain is critical for the accelerated development of agricultural sector and also for increasing producer shares in consumer prices. The World Bank (2010) offers the most clear-cut definition for VCD: "At the heart of VCD is the effort to strengthen mutually beneficial linkages among firms so that they work together to take advantage of market opportunities, that is, to create and build trust among value chain participants. In agriculture they can be thought of as a "farm-to-fork" set of inputs, processes and flows (Miller and da Silva, 2007).

Several authors have given the Value chain definitions based on activities, actors and strategic network:

(1) *Value chain as a set of activities:* Based on activities, World Bank (2010, p. 9) defined "The term value chain describes the full range of value adding activities required to bring a product or service through the different phases of production, including procurement of raw materials

and other inputs". The similar definitions were offered by FAO, IIED, GTZ and ILO.

(2) *Value chain as a set of actors*: Some authors based their definition on actors. Like UNIDO (2011, p. 3) defined a value chain as "actors connected along a chain producing, transforming, and bringing goods and services to end consumers through a sequenced set of activities". CIP (2006, p. 159) defined a value chain as "all the actors, and the entirety of their productive activities, involved in the process of adding value to a specific crop or product".

(3) *Value chain as a strategic network:* In this case, value chains do not simply exist in a particular space but are built for the purpose of better responding to consumer demand. Borrowing from Hobbs *et al*. (2000), CIAT (2007, p. 25) defined value chain as a strategic network among a number of independent business organizations, where network members engage in extensive collaboration. DFID (2008, p. 6) defined a market system as a "multi-player, multi-function arrangement comprising three main sets of functions (core, rules, and supporting) undertaken by different players through which exchange takes place, develops, adapts, and grows".

These three categories of definitions are complementary to some degree: activities are carried out by actors, and actors of different types comprise a strategic network.

Value chains play an important role in transforming agricultural commodities from raw material to finished products as per demand of consumers. The linking of farmers to the markets through efficient value chains would reduce the number of intermediaries in the chain, would increase producers' share in consumer price and market efficiency. The income of the farmers can be enhanced by focusing production as well as productivity, post harvest management, strengthen the value-adding activities by better technology, upgraded infrastructure, processing and finally linking to better market.

Promoting value chain development and establishing an enterprise, require some degree of entrepreneurial behaviour among entrepreneurs (processors).

Entrepreneurial behaviour can be operationally defined as behaviour of an individual that entails different processes undertaken by him in creation of new firms and is the result of continuous interaction of personal factors and entrepreneurial environment (Bird, 1992). One of notable manifestation of entrepreneurial behaviour is Entrepreneurship and the entrepreneurs do not act in vacuum, but react to entrepreneurial environments surrounding them (Peters & Waterman, 1982). Entrepreneurial environments are defined as factors which are critical in developing entrepreneurship in certain regions (Gnyawali & Fogel, 1994). Thus, entrepreneurial environment for promoting value chain development conceptualized to be comprised of various factors like institutional, technical, marketing, infrastructure, legal and financial aspects within the boundaries of the firm and is of direct interest to an individual's decision-making behaviour in the system. The present study aims to identify the entrepreneurial behaviour of stakeholders and entrepreneurial environment promoting value chain development, to map the value chains, to identify training needs of entrepreneurs and to formulate strategies for inducing entrepreneurial behaviour and environment for promoting value chain development.

1.1 Theoretical Approaches to Entrepreneurial Behaviour

There are two main theoretical approaches to entrepreneurship: Discovery Theory (Shane, 2003) and Creation Theory (Casson, 1982, Gartner, 1985). In Creation Theory, decision making context in which entrepreneurs operate is uncertain or ambiguous whereas for Discovery Theory, decision making context is objective. The study considered a Creation Theory approach. The Creation Theory has three main assumptions. The first is that an opportunity is subjective. The second assumption is that individuals (entrepreneurs) create the opportunities (as opposed to recognizing them). Finally, while going through the process, these individuals bear uncertainty, which is the third assumption.

Behaviour can be seen as a function of personal and environment factor (Ekehammar, 1974, Heider, 1958, Lewin, 1951, Sansone et al., 2004). The study takes the premise that entrepreneurial behaviour is an individual action developing through the nascent entrepreneur's interaction with the environment, where environment is understood to include institutional, technical, marketing, financial, legal and infrastructural factors. Explaining through Social Learning Theory (Albert Bandura, 1977), entrepreneurial behaviour as a phenomenon related to an individual

acting (being observed) in an environment of opportunity-based high-growth potential for new venture creation. Thus, entrepreneurial behaviour is the outcome of continuous interaction of personal factors (age, education, experience, training received, landholding, family size etc.) and entrepreneurial environment. The person possessing entrepreneurial behaviour like risk taking ability, innovativeness, locus of control, persistence, resiliency, creative, inquisitive, scientific orientation, achievement motivation etc. with interest in venture creation leads to enterprise establishment.

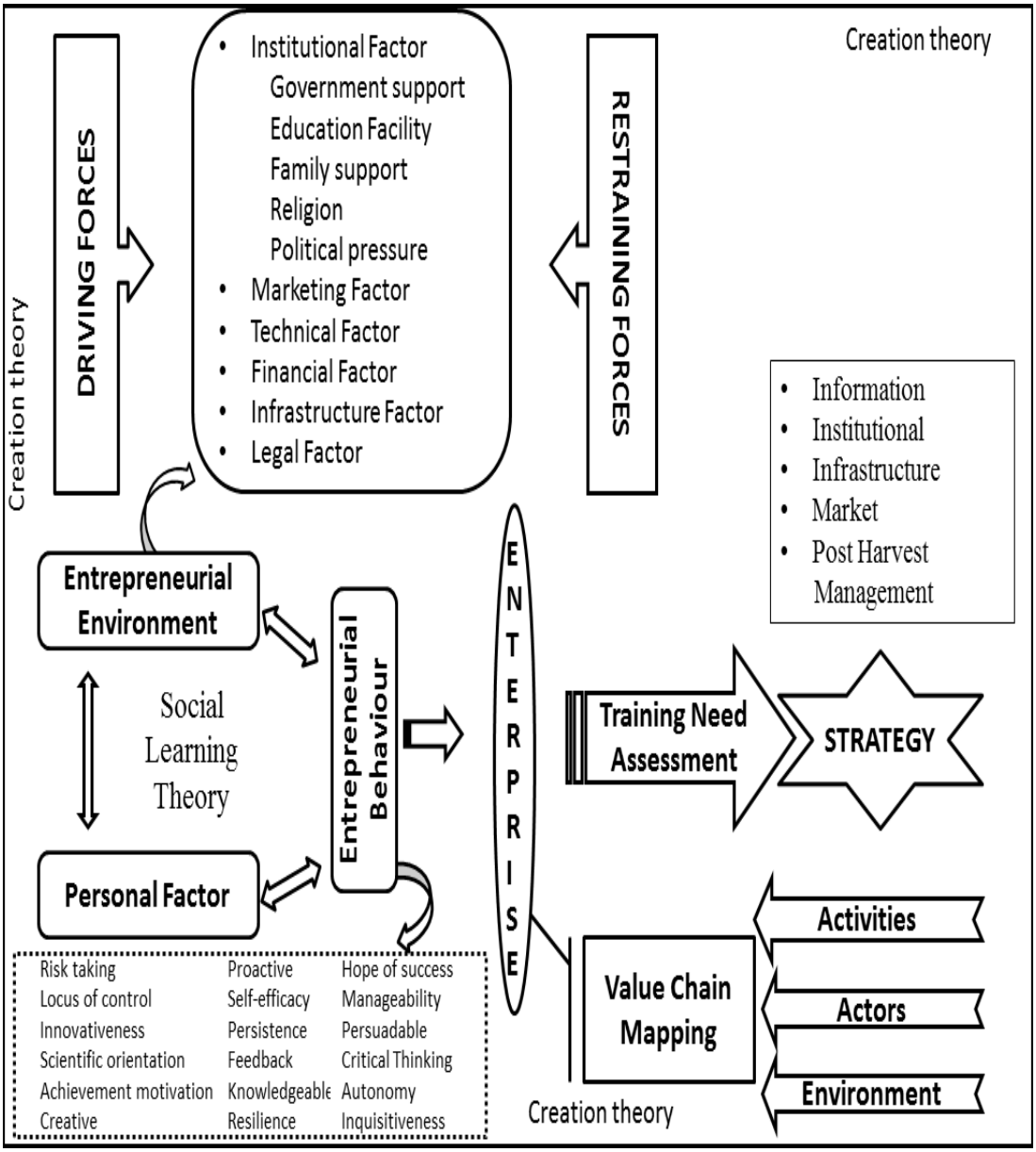

Figure 1.1 Conceptual framework of the study

Linking to Creation Theory, entrepreneurial behaviour is seen here as the combination of actions, carried out by the entrepreneur, which continue to adjust and define the opportunity and position it as acceptable to the market, such that a new venture is the primary outcome. From figure 1.1 it is clear that entrepreneurial behaviour led to enterprise creation, which is the result of entrepreneurial environment and personal factor. The driving and restraining forces would be assessed through force field analysis to the check the favourableness of entrepreneurial environment. The value chain map would be developed to identify the activities, actors (efficiency of marketing channels) and existing entrepreneurial environment through venn diagram. Further, training need would be identified and strategy would be developed to promote efficient value chain.

1.2 Statement of the problem:

Indian agriculture in this era is facing major problems like reduced percentage of producer share in consumer price, huge postharvest losses especially in horticultural crops and insignificant proportion of value addition in agri-commodities. So there is need to focus on beyond farm production and productivity which can be achieve through value chain development. Keeping in view all the aforesaid circumstance, an attempt has been made to study the "Critical Analysis of Entrepreneurial Environment for Value Chain Development."

1.3 Researchable issues:

Considering the above background, a number of researchable issues were drawn which needed serious and sincere investigation. These researchable issues were:-

1. What are the entrepreneurial behaviours of stakeholder for promoting agricultural value chain development?
2. What is the role of existing entrepreneurial environment in promoting value chain development?
3. What is the profitability margin between value added and non-value added agricultural commodities?
4. What are the training needs of processors for value chain development?

5. What are the driving and restraining forces for stakeholders to promote and upgrade value chain development?
6. What are the strategies to overcome constraints faced by stakeholders and facilitate the value chain development?

1.4. Specific Objectives:

Keeping the above-mentioned researchable issues in mind, the present study was focussed on the following specific objectives:-

1. To assess the entrepreneurial behaviour of stakeholders and entrepreneurial environment for value chain development
2. To develop and analyze the value chain maps of selected commodities under study
3. To identify training needs for enhancing the entrepreneurial competencies for value chain development
4. To study the constraints in value chain development and devise a strategy to create entrepreneurial environment to facilitate the value chain development.

1.5 Hypothesis

The study is based on the following hypotheses:-

Hypothesis 1: The processors possessed higher entrepreneurial behavior than farmers

Hypothesis 2: There is significant difference among producers for net return

Hypothesis 3: There is significant difference among processors for net return

Hypothesis 4: There is significant agreement among processors for training need

Hypothesis 5: The driving forces are higher than restraining forces for processors to determine the entrepreneurial environment for upgrading value chain

Hypothesis 6: There is significant difference between processor and farmer for driving forces to promote value chain

Hypothesis 7: There is significant difference between processor and farmer for restraining forces

1.6 Importance and scope of the study

- The study will bring out the entrepreneurial behaviour of respondents and associated factors responsible for developing agricultural value chain.
- It will help in analysing the existing entrepreneurial environment and capitalizing the strengths and minimizing weaknesses.
- Help to identify the training needs of entrepreneurs (processors) for promoting value chain development.
- The identification of various kinds of restraining forces coming in the way of VCD will help in developing strategies to address constraints and promoting VCD.
- The findings of the study will facilitate planners, policy makers, institutions and practitioners for devising appropriate strategy to promote value chain development.

1.7 Limitations of the study

Although every effort has been made to make this study as deep, objective and systematic as possible, but being a student's dissertation project suffers with usual limitations. Some of limitations are indicated below:-

1. The information collected was completely based on the expressed responses and perception of the respondents; hence the complete freedom from individual bias and prejudices cannot be claimed.
2. The study area was confined only to nine districts, so generalization cannot be claimed for whole country.
3. The study was carried out by single researcher with a limited time frame available for conducting the research.
4. The study does have limitation of fund and physical facilities as well.
5. Since the respondents did not keep any records, the responses were based on their ability to recollect or their memory-power.
6. Some aspects which require longitudinal studies and observations that are time dependent could not be studied.

1.6 Organization of the thesis

This dissertation has been organized in six chapters in logical sequence as follows:-

Chapter I: **Introduction:** It contains the pertinent background information, theoretical framework, statement of the problem, objectives and scope of the study along with its limitations.

Chapter II: **Background:** This chapter highlights the findings or reporting of the previous studies relevant to the problem under investigation.

Chapter III: **Research Methodology:** It covers the research design, sampling procedure, method of data collection, measurement of variables and statistical tools applied to analyse the data.

Chapter IV: **Results:** The results obtained from the analysis of collected data are presented in this chapter in the light of the objectives set forth for the study.

Chapter V: **Discussion:** This chapter includes the general discussion on the results of the present study.

Chapter VI: **Summary:** The summary of the results of study with implications is presented to draw specific conclusions.

Bibliography and appendices on information utilized in the present study have been presented at the end of thesis.

Chapter-2

BACKGROUND

A review of literature is an important part of research investigation as it highlights the finding of the past studies relevant to the problem under investigation. It also provides further orientation to the problem, and eliminates the possibility of unnecessary duplication of efforts. In addition, valuable information on research techniques and basis for interpretation and discussion of findings of the present study may be gained from the reports of previous research. Tranfield *et al.* (2003) defined a systematic literature review as "a replicable, scientific, and transparent process that aims to minimize bias through exhaustive literature searches of published and unpublished studies and by providing an audit trail of the reviewer's decisions, procedures, and conclusions". Previous studies pave the way for future research endeavours.

In this chapter, literature as related to 'Entrepreneurial behaviour and entrepreneurial environment for value chain development have been reviewed under the following headings:-

2.1 Entrepreneurial behaviour of processors and farmers

2.2 Entrepreneurial environment to promote value chain

2.3 Value chain development among agricultural commodities

2.4 Training need assessment to promote value chain

2.5 Driving and restraining forces to promote value chain

2.1 Entrepreneurial behaviour of processors and farmers

It was the French economist Richard Cantillon (1755) and Jean-Baptise Say (1805), who are reported to have first used the concept of 'entrepreneur' as a technical one (Schumpeter, 1951). Cantillon has defined the entrepreneur as the agent who organises factors of production with the intention of producing a new product or service (Schumpeter, 1951). Say (1816) included the concept of leadership, that an entrepreneur is one who brings other people together, in order to produce a useful commodity. Schumpeter defined an entrepreneur as the person who is responsible for putting together all factors of production to make quality products,

and hence use the resources in low productivity to high productivity areas. A person, who can efficiently organise these resources in pursuit of an opportunity to add value, may develop the resources and become successful and hence, an entrepreneur. In general terms an entrepreneur is described as "one who organises, manages, and assumes the risks of a business or enterprise" (Woolf, 1980: 378).

There is a strong view in the literature that the success of an entrepreneurial business must be due to the entrepreneur. The business is a purposeful personal creation and thus the characteristics of the entrepreneur are seen to be important.

De (1986) stated that a farmer does not become an entrepreneur only by adopting a new agricultural technology but he becomes an entrepreneur only when he comes to be an operator of a farm business. A business involves rational decisions on investment after assessing risk, other alternatives and possibilities of profit and loss.

Entrepreneurs' personality characteristics have been considered to have impact on organizational performance (Robinson & Sexton, 1994). Many studies found that personality characteristics such as high need for achievement, locus of control and propensity for risk-taking have often been associated with successful entrepreneurship (Begley & Boyd, 1987; McClelland, 1987; Miner, 1996; Brandstaetter, 1997). In his study, Kiggundu (2002) found that personality characteristics have direct influence on the success of African entrepreneurs.

McClelland (1987) identified the 'need for achievement' as the fundamental driving trait in the personality of successful entrepreneurs. Other authors stated that entrepreneurial characteristics in forms of creativity and need for achievement are critical success factors (Rotter, 1966; Barkham, 1994; Jaafar *et al.*, 2004). The need for achievement results in high ambition and self-drive, which are necessary if entrepreneurs are to realize large goals against many odds (Wickham, 2001; Stewart *et al.*, 2003; Rwigema & Venter, 2004; Gurol & Atsan, 2006).

Locus of control, a concept taken from a social theory developed by Rotter in the 1960s (Rotter, 1966), refers to the degree to which an individual perceives the outcome of an event to be either within or beyond his or her personal control (Morris & Zahra, 2000). People with an internal locus of control, who perceive the events within their control, believe in themselves to be in control of their destiny. People

with an external locus of control, who consider the events beyond their control, believe they are under the control of others, fate and chance (Rauch & Frese, 2000; Mueller & Thomas, 2001). In an empirical investigation of 97 firms, Miller (1996) observed a positive relationship between internal locus of control and the performance of the firm, which nevertheless varies in function of environmental variables.

Successful SME operators tend to be moderate risk takers who make calculated risk assessments and they are not afraid of failing; rather they are intent on succeeding (Morris & Zahra, 2000). Less successful SMEs do not plan for contingencies and rely on luck alone, which can be characterised as reckless (Rwigema & Venter, 2004).

The approach of exploratory factor analysis was successfully done to yield a set of independent factors to represent the entrepreneurial behaviour and entrepreneurial success of Agri Clinic entrepreneurs. It was interesting to note that the planning orientation, work orientation, personal efficacy, market preparedness, and business acumen had the maximum number of variables clustered together. Location and dynamism had three variables each that were clustered together. The factors: in-depth knowledge, achievement motivation, innovativeness, internal locus of control, marketing strategy, interest, social networking, service orientation were found to be independently contributing to the successful entrepreneurial behaviour of the Agri Clinic agripreneurs.

Nandapurkar (1982) stated that entrepreneurial behaviour consists of different components like farm decision making, innovativeness, risk taking ability, achievement motivation, information seeking, knowledge of the farming, assistance of management service, co-ordination of farm activities, cosmopoliteness and leadership ability

Narmatha *et al.* (2002) stated that innovativeness, achievement motivation and risk orientation were the most important components. And further, the component decision making, innovativeness, management orientation, economic motivation, level of aspiration and risk orientation were found to be crucial in influencing the entrepreneurial behaviour.

5.2 Entrepreneurial Environment to promote value chain

The success of enterprises is a function of both external and internal factors (Penrose, 1959; McCline *et al.*, 2000; Guzman & santos, 2001; Markman & Baron, 2003). External factors have been found to have an impact on the performance potential of firms. Organizational ecology, introduced by Hannan & Freeman (1977), suggests that organizations are constrained by the external environment they operate in and, consequently, the firm's growth is determined largely by these external forces.

Dahlqvist *et al.* (2000) pointed out that external factors present opportunities, threats and information with the potential to affect all entrepreneurs within their environment, regardless of their background, education or business concept. Guzman & Santos (2001) listed external factors to include socio-demographics, markets (local, international, emerging and established markets), cultural, economic, political, institutional, legal, productive, technological, infrastructure and other physical factors of that particular environment.

According to Miller & Dess (1996), the external environment of the enterprise can be classified into two, namely, general and competitive environments. The general environment consists of the political-legal, macroeconomic, socio-cultural, technological, demographic and global factors that might affect the organization's activities. On the other hand, the competitive environment consists of other specific organizations that are likely to influence the profitability of the enterprise, such as customers, suppliers and competitors.

Much of the literature has supported the idea that a high percentage of entrepreneurs come from fathers who are entrepreneurs themselves (e.g. Hisrich & Brush, 1987; Gray *et al.*, 2006).

As for the enterprise itself, most studies of the survival of firms primarily find that the age and size of a firm seemed to positively affect its survival (Freeman *et al*., 1983; Dunne *et al.*, 1989; Mata & Portugal, 1994; Mitchell 1994; Audretsch & Mahmood, 1994; Henderson, 1999). For firm age, it is argued that new entrants firms face a phenomenon known as the 'liability of newness' effect, which was proposed by Stinchcombe (1965). This perspective suggests that new firms face a greater risk of failure as compared to older ones. This is because older and more established firms are likely to have more developed routines and established

processes and greater access to resources in comparison to younger and less established firms (Sorensen & Stuart, 2000; Carroll & Hannan, 2000; Nelson & Winter, 1982).

The literature on firm survival has identified several factors to influence the survival of SMEs. Bruderl *et al.* (1992) classified the evidence into three groups of factors: (i) Individual specific factors; (ii) firm specific factors and (iii) environmental factors.

Several researchers have argued that the general state of an economy, in which a firm competes, influences the performance of a business (Boddy, 2002; Ligthelm & Cant, 2002; Baron, 2004; Gurol & Atsan, 2006; Nieman, 2006). Thompson (2001) pointed out that economic conditions affect how easy or how difficult it is to be successful and profitable at any time because they affect both capital availability and cost, and demand. The economic factors considered in this study are: access to finance and taxation.

Data from several sources have identified financial resources as a fundamental element for the success of businesses. Indeed, entrepreneurs need to have sufficient financial resources in order not only to help their businesses during the start-up phase but also throughout the lifetime of the business. Beck *et al.* (2006) argued that in a competitive business environment, availability of financial resources is cardinal for the development process as it facilitates entry, exit and growth of firms.

Taxation can have important effects on many parts of the economy, including impacts on firm creation and on the development of SMEs. Developing an environment conducive to SME growth while ensuring tax compliance is a challenge all countries face. Robertson *et al.* (2003) pointed out that one of the key factors inhibiting SME development is taxation. If tax rates are high, they reduce the profit incentive drastically (Ahwireng-Obeng & Piaray, 1999).

The importance of government support to small business success has been reported in a number of studies. Yusuf (1995), in his study on 220 small business entrepreneurs in the South Pacific region, listed nine factors that would contribute to the success of small businesses; but among the most critical factors was satisfactory government support. The finding of Yusuf (1995), however, made a distinction

between entrepreneurs in terms of ethnic backgrounds. According to him, government support was more critical for the success of small indigenous entrepreneurs than the non-indigenous ones. Similarly, Sarder *et al.* (1997) conducted a study of 161 small enterprises in Bangladesh and found that firms receiving support services, such as marketing, management education and training, technical, extension and consultancy, information, and common facilities from the public or private agencies experienced a significant increase in sales, employment and productivity. In a recent quantitative study about the determinants of business success of small and medium enterprises in Pakistan, Jasra *et al.* (2011) found that government support was highly correlated with business success.

The socio-cultural factors involve the social and cultural aspects of the environment. These consist of customs, lifestyles, and values that characterize the society in which firms operate. Several researchers argued that these factors have far-reaching influence on the business performance (Wasilczuk, 2000; Boddy, 2002; Gurol & Atsan, 2006).

In contrast to these studies, other studies have found that government support was unimportant to small business success. Using a comparative case study approach on small plastic manufacturing firms (SPMFs) and entrepreneurs in Nigeria, Mambula (2004) found that firms receiving credit and other forms of assistance did not perform better than those less privileged ones. This was consistent with the findings of Kirpalani & Macintosh (1980) who studied 34 small and medium firms in the USA and Canada, and found that internal factors such as involvement of top management, research and development (R & D), technology, marketing mix, and production function, and not government assistance that determined the firm success in international marketing. To them, government assistance is regarded as a hygiene factor in the sense that it is an enabling condition for small firms to compete in global markets, but insufficient for their success.

Technological factors can affect all aspects of a business, from its overall strategic position to how it manages marketing, design, production, and distribution (Boddy, 2002). The technological factors considered in this study are: access to technology, access to information, and access to infrastructure.

According to Olawale & Garwe (2010), technology not only helps in evolving a multi-pronged strategy, but also in maximizing business opportunities. According to Rogerson (2001), SMEs need access to appropriate technology if they are to have competitive advantage.

Good quality and accessibility of infrastructure services encourage investments, productivity and growth of businesses; whereas, poor quality and inaccessibility of such services affect the conduct of business by slowing productivity and growth (The World Bank, 1994; Clover & Darroch, 2005; Nabli, 2007; Bottasso & Conti, 2010).

Internal factors are also referred to as endogenous factors. According to Guzman & Santos (2001), the personal environment (internal or firm-based factors) has an impact on entrepreneurship and business success. It includes all firm-specific factors that are influenced by specific firm action, including the availability of resources, personal skills and abilities for pursuing entrepreneurial functions and the effective use of resources inside the firm (Nieman, 2006). These internal factors are thus potentially controllable since they involve the decisions, behaviour and actions of the entrepreneurs and his or her team (Kangasharju, 2000; Ligthelm & Cant, 2002). Thus, it can be argued that deficiencies in the internal environment are the proximate cause of SME failures, with over 65% of failure causes said to be firm based (Ligthelm & Cant, 2002; Dockel & Ligthelm, 2005).

2.3 Value chain development among agricultural commodities

UNIDO (2011) defined a value chain as “actors connected along a chain producing, transforming, and bringing goods and services to end consumers through a sequenced set of activities. World Bank (2010) defined “The term value chain describes the full range of value adding activities required to bring a product or service through the different phases of production, including procurement of raw materials and other inputs”. The value chains do not simply exist in a particular space but are built for the purpose of better responding to consumer demand. According to Hobbs *et al*. (2000), CIAT (2007, p. 25) defined value chains as a strategic network among a number of independent business organizations, where network members engage in extensive collaboration.

Several studies have been conducted on major actors involved in value chain of vegetables; however, the notable finding of few studies has been mentioned here. The study conducted in Ranchi district of Jharkhand found that for disposing perishable vegetables like tomato, cauliflower and okra etc. the farmers mainly preferred a short marketing channel (producer—consumer/or producer—retailer– –consumer); and for semi-perishable vegetables like potato and onion, a relatively long marketing channel (producer—wholesaler/commission agents—retailer—consumer) was preferred (Saha *et al.,* 2015). In short marketing channels, the producer's share in consumer's rupees was higher compare to long one. Similar observation has been seen by the other study that with the increase in number of intermediaries in marketing supply chains; there was significant decreased in net profit of the producer, marketing efficiency and producers' share in consumer price; whereas marketing cost, marketing loss and consumer purchase price increased significantly. The suggestions has been given by several studies that to provide higher net profit to producer and competitive price to consumer for tomato, cabbage and cauliflower, it is important to introduce single window marketing system as well as provide better facilities for storage, transportation and marketing of tomato, cabbage and cauliflower. (Imtiyaz and Soni, 2014; Radha and Prasad, 2001).

Pant and Hada (2004) worked on marketing of maize (*Zea Mays* L.) in Rajasthan. This investigation was carried out to study the marketing channels for maize and to estimate the marketing cost, margin of middle man and producers share in consumer's rupee in various marketing channels. They concluded that nine marketing channels existed and the percentage share of producer in consumer rupee was maximum in channel 1 (Farmer-Consumer) and channel 7 (Farmer-Flourmill-Retailer-Consumer) *i.e.* 99.95 and 89.68 per cent respectively. Village traders retained the highest margin which ranged from Rs. 35.60 to Rs. 147.00 per quintal followed by retailers whose margin ranged from Rs. 10.00 to Rs. 70.62 per quintal whereas commission agent cum wholesaler retained minimum margin of Rs. 26.70 to Rs. 63.75 per quintal.

Suryavanshi *et al.* (2006) conducted a study on economic analysis of tomato marketing in Latur Districts of Marathwada region. They identified marketing channels, to estimate marketing cost, marketing margin and price elasticity. The study revealed that 80 percent of the tomato was sold through channel (producer-

commission agent cum wholesaler-retailer-consumer). The cost of marketing incurred was the highest (Rs. 187.45) in channel-I, where as it was the lowest (Rs. 55.40) in channel (producer-consumer). Marketing efficiency was observed to be the highest (9.70%) in channel (producer-consumer) for achieving maximum profit and to reduce intermediary charges in trade, when the produce is in small quantity and if the produce is in large quantity channel-II should be selected to safeguard the interest of tomato growers. Sharma *et al.* (2004) has studied the structure and extent of value addition in different agro-processing units in Himachal Pradesh. The extent of value addition has been about 53 per cent in the processing sector. The maximum value addition has been observed in fruits/vegetable processing (133%), followed by bakery and confectionery units. A direct relationship has been found between size of the firm and number of its backward and forward linkages. The suggestions and recommendations emerging from the investigation include policy thrust and emphasis on developing industrial areas in raw material producing regions, thrust on small-scale industries for self-employment in micro enterprises in rural areas, promotion of supporting and subsidiary (intermediate) industries to diversify value addition activities, cost effective and adequate supply of raw material by strengthening direct linkages through suitable contract farming models, liberal credit policy to modernize processing units and encouraging formation of small industries consortia or associations for collective marketing and sales promotion.

Sidhu *et al*. (2011) studied the marketing efficiency of green peas under different supply chains in Punjab. The marketing of green peas has been studied by three supply chains, viz.

I: Producer — wholesaler (through commission agent) — retailer — consumer

II: Producer — retailer (through commission agent) — consumer

III: Producer —consumer.

The net price received by the producer was 67 per cent, 69 per cent and 94 per cent in supply chains I, II and III respectively in the Hoshiarpur market in January, 2009. The producer's share in supply chain III was the maximum because of direct sale by the producer to the consumer. The supply chain III has been found most efficient because its marketing efficiency was 14.83 as compared to 2.70 in

supply chain II and 2.38 in supply chain I. The low marketing efficiency in supply chain I was on account of a higher number of market intermediaries in this chain. The functional analysis of the factors affecting the marketing efficiency has revealed that with one per cent increase in marketing margins and costs, the marketing efficiency declined by 0.45 per cent and 0.44 per cent, respectively. The margin of the retailer was high in supply chain II as compared to supply chain I because the wholesaler was not involved.

The literature supported that poor forward and backward linkages in the marketing channels and poor marketing infrastructure were leading to high and fluctuating consumer prices and only a small proportion of the consumer rupee reaching the farmers (Kaul, 1997). Analysis of prices at different levels indicated that the average producers' share in the consumer price is only around 48 per cent for vegetables and 37 per cent for fruits (Gandhi and Namboodiri, 2002). In addition, Kumar, *et al.* (2004) observed that the farm gate prices for vegetables and fruits range between 20-30% of the eventual retail prices in India as against developed countries such as U.S.A., U.K. and Japan, the farm gate prices between 40-55% of retail prices. There was substantial wastage, deterioration in quality, and frequent mis-match between demand and supply spatially and over time (Singh *et al.*, 1985).

There are number of intermediaries who are involve in value chain of Fruits and Vegetables from the farmer‘s field to the end consumer, who carries out several functions, such as transfer of ownership of commodities, its movement, maintenance and preservation of quantity & quality, payment to the seller and commodity delivery to the buyer (Halder & Pati, 2011). A cold chain is a logistic system that protects a wide variety of horticultural produce from spoilage by providing a series of controlled temperature, storage and transport facilities from farm to fork. Presently, there is huge cold storage gap of about 3.28 million MT (MoFPI, 2017) and moreover, the cold storage facilities were available mainly in the wholesale market or nearby. There is need of proper conditioned temperature for maintaining and sustaining the perishable goods for longer period of time as well as ensuring its quality to consumers but the weak and ill equipped cold chain infrastructure (Rathore *et al.*, 2010), improper marketing systems and facilities (Singh *et al.*, 2008) of the country has become the major impediments in the growth of the sector

Several IFPRI studies in India confirmed that higher profit earned by contract farmers against non-contract farmers mainly due to lowering marketing and transaction costs and, in some cases, offering better prices. An IFPRI study of Mother Dairy, Nestle, and Venkateshwara Hatcheries showed that contracting was beneficial because it helped contracted farmers to reduced cultivation cost and earned better price compared to non-contract farmers (Birthal *et al.* 2006). The summary results from the study showed that the net profit for the contract dairy farmers was more than double that of non-contract farmers, higher for vegetable farmers (78%) and poultry farmers (13%). Production costs reduced to approximately 21 per cent for contracted farmers in case of vegetables owing to lower share of transaction and marketing costs. Therefore, several studies emphasized on organized retail and confirmed the relative advantages for farmers connected with organised retail on fresh fruit and vegetable retail chains in India. For instance, retail chain- contracted farmers received comparatively higher prices (Alam and Verma, 2007), higher net profits (Birthal *et al.*, 2005) and also had lower transaction costs (Singh and Singla, 2010; Alam and Verma, 2007). Presently, Haryali Kisan Bazaars, Mahindra and Mahindra's Shubh Labh Stores, Tata/Rallis's Kisan Kendras, Escort's rural stores, and ITC-led Choupal Sagars are similar business hubs that provide value-added services like soil-testing facilities, education services, credit services, and agri-input supply to village farmers.

2.3 Training need assessment to promote value chain

Entrepreneurial and business skills can be acquired through learning on the job or training. According to Antonites, A.J. (2003), the transfer of skills can effectively take place by means of participation of skilled individuals/employees in the learning of unskilled individuals. This study, based on the ways of entrepreneurial learning, emphasised on the importance of the development of entrepreneurial skills in order to lead a competitive entrepreneurial business.

The UmsobomvuYouth Fund also offered some training programs which allude to the fact that to be successful entrepreneurs, required being equipped with both entrepreneurial as well as business skills to secure competitive businesses. It pointed out that all the business and entrepreneurial skills are vital to the sustainability of the business and should, therefore, be taught to the aspiring entrepreneurs.

Furthermore, Solomon (2004), in his study on entrepreneurial training, also discovered the need for entrepreneurial skills and business skills for the upkeep of the business. The entrepreneur's initiative and skill are significant determinants of success. Training for small business is primarily internally focused and imparts generic management skills such as marketing, finance, record-keeping, human relations, as well as industrial relations (Solomon, 2004). In conclusion it is maintained that entrepreneurial training improves SME performance over time, showing that the business and the entrepreneurial skills are really of importance in the business world, especially for entrepreneurs. Business and entrepreneurial skills are important for the sustainability and profitability of businesses (Smith *et al.*, 2005).

According to Botha (2006), the absence or low levels of key skills like motivation, ability to gather resources, financial management, human resource management, marketing and technical skills, may lead to zero performance, while weakness in a particular element would decrease effectiveness in the overall performance of the venture. This thus means that the increase in the capacity of any of these skills can lead to an increase in the entrepreneurial performance of the entrepreneur. Supportive skills on the other hand, their absence would reduce performance, yet not completely destroy the business. This also means that an increase in the capacity of any of these supporting skills will also assist with SMEs performance. This gives a view that it is important to have all the core skills in place so as to get the desired performance and also the supportive skills to boost the business performance.

Wilson (2004) states that an entrepreneurship training course is about the creation of a new business venture where the emphasis will be on profitability, growth and exit strategies.

According to Ladzani and Van Vuuren (2002), very few programmes are assessed and there is a need for research to be undertaken to assess the content and impact of training programmes

Access to new information is indispensable for the initiation, survival and growth of firms (Mead & Liedholm, 1998; Kristiansen, 2002; Duh, 2003; Swierczek & Ha, 2003). The availability of new information is found to be dependent on

personal characteristics such as the level of education, infrastructure qualities such as media coverage and telecommunication systems, and on social capital such as networks (Kristiansen, 2003). The establishment of an active SME sector and the effective utilization of quality business information have been identified as crucial in attaining long-term and sustainable economic growth for developed and developing countries alike (Corps, 2005). In a study about the importance of the information use for the success of SMEs in Belgium, which was carried on 208 SME owner-managers, Lybaert (1998) found that there is a positive relation between the extent of information use and the performance of a SME.

A network is a specific type of relation linking a defined set of persons, objects or events or a set within which certain types of mutually rewarding relationships exist. From such a network, an entrepreneur can obtain resources and get critical support for the development and growth of a business (Dodd & Patra, 2002; Harris & Wheeler, 2005). Networks can be categorized as those that provide personal support, professional support (entrepreneurial networks) or public support (social networks) (Jack & Robson, 2002; Dodd & Patra, 2002; Markman & Baron, 2003; Hite, 2005).

In business, entrepreneurs are required to deal with many people including suppliers, customers, employees, government authorities, competitors, and other stakeholders. This contact gives them access to information and other resources (Jenssen & Greve, 2002). Evidence has suggested that small firms in particular are critically dependent on their networks, because it is through these that they gain advice and support from professionals and experts such as lawyers, accountants, and consultants (Ramsden & Bennett, 2005),

The business dictionary (2012) defines the micro-environmental factors as “factors or elements in an organization's immediate area of operations that affect its performance and decision-making freedom. These factors include competitors, customers, distribution channels, suppliers, and the general public. Generally, deficiencies in the internal micro-environment are the major causes of small business failures. It is perceived that the major causes for these failures are mainly due to the lack of managerial skills, good leadership skills, and financial knowledge.

According to Porter (1998), one of the foremost academics on the subject of competition and competitive strategies, the key for competitive success is the strategy. He suggested three generic competitive strategies for business success: cost leadership, differentiation, and focus on a small group of customers.

The study of Gadenne (1998) revealed that the success of small firms in the manufacturing industry may depend on maintaining a competitive advantage, which involves a combination of (i) acquiring knowledge of competitors' activities; and (ii) pricing products lower than competitors.

2.4 Driving and restraining forces to promote value chain

Generally, constraints related to the availability of financial resources are frequently mentioned in the literature when covering the theme. Several empirical studies about finance have demonstrated that access to finance constitutes a major constraint to SMEs financing. SMEs find it more difficult than larger firms to obtain external finance for several reasons: information asymmetry, lack of collateral, and the higher cost of serving smaller transactions (The International Finance Corporation, 2010). Similar work done by several authors like Schiffer & Weder (2001), Beck *et al.* (2006), Beck & Demirgüç-Kunt (2006), and Beck *et al.* (2008). In a study of 10.00 firms across 80 countries, Shiffer & Weder (2001) found that credit was mentioned more frequently by smaller firms as a constraint on growth. Similarly, based on data from a firm-level survey in 48 countries, Beck *et al.* (2008) concluded that smaller firms in countries with underdeveloped financial and legal systems use less external finance.

In their study about Vietnamese SMEs, Swierczek & Ha (2003) found that lack of equipment and outdated technology are among hindrances to SME development. The owner-managers of successful businesses have a wide access to technology, whereas, the ones from less successful businesses are characterised as having limited access to technology. This implies that access to technology has a crucial impact on the success of SMEs according to Olawale & Garwe (2010).

According to the OECD and the African Development Bank (AfDB) report 'African economic outlook 2009' (2009), access to credit in Africa is more difficult than other regions of the world. This is mainly because of the lack of credit information and collateral requirements. In an Economic Commission for Africa

report, Elhiraika & Nkurunziza (2006) argued that African SMEs often lack credit history, adequate collateral, legal status, and are vulnerable to shocks. Hence, they are viewed as risky by banks that adhere to international standards. Morocco does not constitute an exception with regard to the financial constraint. According to the World Bank (2012), Morocco stands at 98 in the ranking of 183 economies on the ease of getting credit. Rachdi (2006) found that the second most frequent problem faced by entrepreneurs, after the administrative burden, was access to finance.

In a study about Kenyan SMEs, complicated tax forms, heavy control by government, and outright misinterpretation of laws were common problems faced by small business owners in Kenya (Pratt, 2001; Chu *et al.*, 2007). In line with this, Ufuk & Ozgen (2001), in their study of Turkish women entrepreneurs found that the heaviest burden imposed on entrepreneurs was debt and tax payments.

Conducting a principal component analysis (PCA) of owners' perceived constraints on agribusiness SME survival and growth in KwaZulu-Natal in South Africa, Clover & Darroch (2005) found that the factor, which was labeled 'lack of services', explained the highest variance in the data. This factor included: access to electricity, inadequate business premises, lack of own transport, access to water, roads, postal services and telecommunications, and crime.

For the MENA region, an important constraint to growth that has been highlighted in the literature is the lack of adequate infrastructure, an important exception being the Gulf countries. As Nabli (2007) noted, according to the World Bank's Investment Climate Assessments, almost half of private businesses in the MENA region complain that infrastructure is a moderate to major obstacle to conducting business. Telecommunications and transport, two backbone services, are significantly underdeveloped. Page & Van Gelder (2001) argued that the problem here is both with an institutional framework that does not align prices with costs, and with lack of an enabling environment that would permit and entice provision by the private sector.

Larsson *et al.* (2003) found that a lack of contacts with outside expert advisers was an obstacle to the expansion of small businesses.

Various studies revealed that a good transport infrastructure enables a significant reduction in transport costs and delivery times. This corroborates the

findings of several studies that associated the quality of infrastructure with reduction in transport costs, which in turn improve trade volumes (Limao & Venables, 2001; Clarke *et al.*, 2004; Nordås & Piermartini, 2004; Wilson *et al.*, 2005).

A substantial literature that supports the notion that a high percentage of entrepreneurs come from parents who are entrepreneurs themselves (e.g. Hisrich & Brush, 1987; Bolton & Thompson, 2004; Gray *et al.*, 2006)

Chapter- 3

RESEARCH METHODOLOGY

Research methodology is considered to be a 'blue-print' of the research architect. The term methodology, in broad sense, refers to the process, principles and procedures by which we approach our problems and seek their answers. In social science, the term "methodology" is applied to know about how one carries out the process of research. In this chapter, an attempt has been made to explain the various methods and procedures followed to investigate the problem under the following sub-heads:

3.1 Research Design

3.2 Locale of Research

3.3 Pilot Study

3.4 Sampling Procedure

3.5 Variables and their measurements

3.6 Statistical tools used in data analysis

3.1 Research Design

Research design is the entire process of scheduling and carrying out research. Kerlinger (1964) defined "Research design as the plan, structure, and strategy of investigation so as to obtain answers to research questions and to control variance". This study aimed at finding out the entrepreneurial behaviour of entrepreneurs (processors) and farmers; the entrepreneurial environment affecting it; their training needs and the existing value chain for particular agricultural commodities in particular area. Since the problems under the study have already taken place, and the researcher has no control in any way; hence, the *ex-post facto* research design was applied for this study. According to Kerlinger (1964), *ex-post facto* research is a systematic empirical enquiry in which the investigator does not have controls over variables, as their manifestations have already taken place and they are inherently not manipulated.

3.2 Locale of the study

3.2.1 Selection of commodities

The agricultural commodities like food grains (Maize, Wheat and Soybean); vegetables (Potato, Tomato and Mushroom) and fruits (Mango, Guava and Aonla) were selected purposively based on their post-harvest losses and/or potential for undergoing value chain development.

3.2.1. (a) Post-harvest losses in selected fruits and potential for value chain development

From the secondary sources (Table no.3.2.1.a) it can be inferred that post-harvest losses in selected fruits was higher in guava then mango. As the number of channels increase, the post-harvest losses also increase. So, there is need for value addition due to its high perishability and their huge potential for converting into value added products.

Table 3.2.1 (a) Percentage of post-harvest losses of selected fruits at national level

Commo-dities	Farm operation	Farm level storage	Cold Storage	Whole-saler storage	Retailer level storage	Processing unit storage	Total storage loss	Overall loss
Mango	10.6	0.06 (1.5)	-	0.92 (2.5)	0.93 (2.7)	0.19 (0.9)	2.1	12.7
Guava	13.9	0.41 (2.1)	-	1.83 (5.9)	1.80 (3.8)	0.06 (5.7)	4.1	18.1

(Source: Nanda *et al*, 2012; Figure in parentheses indicate the percentage loss in channel

Mango, the king of fruit, at almost every stage of growth, development, maturity and ripening can be processed into various products like mango powder, pickle, chutney etc. from raw mango. Green mango is a source of an excellent drink. Ripe mangoes are utilized for making juice, shake, papad, toffee, squash etc. After drying it, mango slices and powder are prepared. In modern time, technology has been standardized to obtain frozen mango slices (Rao, 2012). Likewise, there is immense potential for value addition in other fruits also like orange, apple, banana, grapes etc.

Similarly from Guava number of processed products can be obtained; the fruit is famous especially for preparing a high quality natural jelly due to rich amount of pectin presence. The other guava products such as candy, toffee nectars, beverages, cheese, ice cream topping etc. are made through processed guava pulp. The other products not generally popular in India are guava powder, canned guavas with sugar syrup (40° Brix) and dehydrated guavas (Rao, 2012).

Aonla fruit is a good source of vitamin C and has medicinal value but it is not popular as table fruit due to its sour and sharp taste. However, it can be processed into a number of food products like preserve jam, jelly, juice, laddu, burfi, dried powder, candy, toffee, pickle, cider, shreds etc. (Goyal *et al.*, 2008; Bhattacherjee *et al.*, 2011).

3.2.1. (b) Post-harvest losses in selected vegetables and potential for value chain development

From the literature, it can be concluded that post-harvest losses among vegetables was more especially in tomato followed by mushroom and potato as evident from table 3.2.1 (b). The insignificant (4%) proportion of vegetables are being processed in spite of their huge potential of value addition.

Table 3.2.1 (b) Percentage of post-harvest losses of selected vegetables at national level

Commo-dities	Farm operation	Farm level storage	Cold Storage	Whole-saler storage	Retailer level storage	Processing unit storage	Total storage loss	Overall loss
Tomato	9.9	0.17 (4.6)	0.01 (1.6)	1.23 (2.7)	0.98 (2.3)	0.11 (2.0)	2.5	13.0
Potato	6.7	0.36 (3.9)	0.78 (1.4)	0.96 (3.9)	0.19 (2.4)	0.01 (0.4)	2.3	9.0
Mushroom	11.0	-	-	-	1.50 (1.7)	-	1.5	12.5

(Source: Nanda *et al*, 2012; Figure in parentheses indicate the percentage loss in channel)

Tomato is the second largely grown vegetable, but facing huge post-harvest challenges due to its high perishability. Only 1 per cent of total tomato production is processed against 14 per cent in China. Around 1-2 per cent of Indian tomatoes were exported in 2011, but interstate trade within India is significant (FAOSTAT, 2013). Commercially, the vegetable is used in the preparation of tomato puree or ketchup, but the local varieties were not found to be suitable due to lower total soluble solids

(Balaswamy, *et al.* 2015). The other value-added tomato-based products are puree, paste, salsa, pizza sauce, ketchup, juice, chutney, powder, instant tomato soup etc.

Another vegetable, Potato, the most widely grown vegetable in India, is facing much fluctuation in prices of raw potato as compared to the processed one. There is great potential for processing of potatoes into several products like chips, French fries, cubes, granules and canned products (Pandey *et al*., 2014).

Mushroom is a commercial vegetable and rich source of good quality protein, minerals and vitamins but due to its perishable in nature; the processing is the only alternative in order to utilize excess production in the season and to make it available during off season. There are a number of value-added mushroom based products that can be prepared such as canned mushroom, ketch-up, murabba, candy, chips, pickles, mushroom soup, powder, biscuit, nuggets etc.

3.2.1. (c) Post-harvest losses in selected food grains and potential for value chain development

From secondary source, it is evident that as the number of stages/ channel increases the losses of food grains also increase depicted in Table 3.2.1 (c). Thus, it is requisite to focus on beyond farm production and adopt value addition to increase producers' share in consumer prices as well as to reduce food grains wastage. There is enough potential for value addition in maize like popcorn, corn flakes, corn flour, corn oil, corn syrup etc. Similarly for wheat products like semolina, wheat flour, pasta, macaroni, breads etc. are possible and from soybean potential products are soybean oil, *tofu*, chunks, granules, etc.

Table 3.2.1 (c) Percentage of post-harvest losses of selected food grains at national level

Commo-dities	Farm operation	Farm level storage	Ware-house	Whole-saler storage	Retailer level storage	Processing unit storage	Total storage loss	Overall loss
Wheat	4.7	0.59 (1.5)	0.06 (0.5)	0.13 (0.7)	0.04 (0.8)	0.48 (1.7)	1.3	6.0
Maize	2.8	0.41 (1.7)	0.01 (0.2)	0.66 (1.7)	0.11 (0.7)	0.11 (0.7)	1.3	4.1
Soybean	5.8	0.10 (0.8)	0.01 (0.1)	0.24 (0.5)	0.04 (0.4)	0.01 (0.1)	0.4	6.2

(Source: Nanda *et al*, 2012; Figure in parentheses indicate the percentage loss in channel)

3.2.2 Selection of districts

After the selection of agricultural commodities, the states and further districts were selected purposively for each identified agricultural commodities based on high production under crop and/or potential for value chain development as presented in Table 3.2.2. Selected districts for the present study were Samastipur (Maize), Meerut (Potato), Lucknow (Mango), Allahabad (Guava), Pratapgarh (Aonla), Sonepat (Mushroom) and Indore (Wheat, Soybean, Tomato). Detailed analyses of availability of respondents were carried out with the assistance of experts from IARI, KVKs, IARI Regional Stations and State Agricultural Universities. A comprehensive list of entrepreneurs and producers was developed with the help of experts.

Table 3.2.2 Selected Agricultural commodities, its post-harvest losses, present status and its potential for value chain development

	Commo-dities	Post-Harvest losses	Present Status	VCD Potential	Institutional Support
FOODGRAINS	**Wheat**	4.93%	State-wise value of output highest in MP (506445 lakh) & 14.20 % share	Samolina, maida, pasta, macroni, *sewain*	IARI (RS)
	Maize	4.63%	2nd largest yield in Bihar (30.8 Qtl/ha)	Corn flakes, sweet corn, starch, glucose, oil, glucose syrup, pop corn	RAU, IARI (RS)
	Soybean	2.38 %	MP Rank 1st (5.37 mt & 6.03 mha); 53.18 % share	full-fat soya flour, soya fortified biscuits, soya paneer, soya milk, soya candy, soya nuts, nutri-nuggets, soya sticks	IISR CIAE, Bhopal
VEGETABLES	**Potato**	9	UP Rank 1st in Area & Production	Chips, Finger Chips, Papad, Aloo bhujia	CPRI (RS) Modipuram,
	Tomato	12.98 (highest)	Production & Area in MP (2177000 ton & 70230 ha)	Sauce, Chutney, Puree, Ketchup, powder, instant soup	KVK
	Mushroom	12.5 (second highest)	Value of output 2nd highest in Haryana (3600 lakh)	Powder, Fresh /Dry oyster, spawn, soup, pickles, patties	Mushroom Research & Development Project at Murthal (Sonepat)

FRUIT	**Mango**	9.16	UP Rank 1st in Area & Production	Bars, Candy, Juice, Squash, Jam, Jelly, Slices, Pickles etc.	CISH KVK
	Guava	15.88 (highest)	UP Rank 1st in Area & Production	Candy, Juice, Squash, etc.	KVK
	Aonla		UP Rank 1st in Area & Production	Candy, Juice, Murabba etc.	KVK

3.3 Sampling and Data Collection

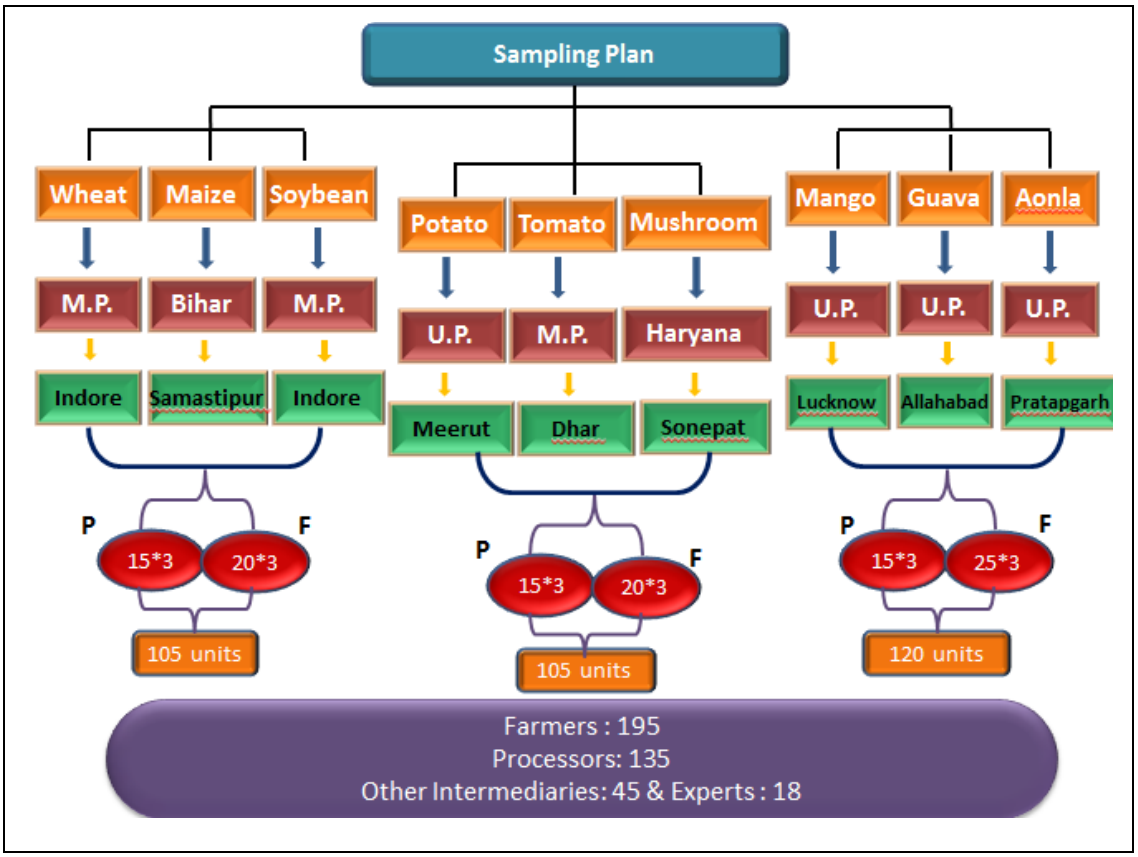

Figure 3.1: Sampling plan

A stratified random sampling was followed in selection of respondents. From each of the identified agricultural commodity based stratum a random sample of 15 entrepreneurs who were engaged in value addition were selected. Further, 20 farmers in each vegetables and food grain agricultural commodities and 25 farmers from each fruit (orchard) crops were selected (only producer) from extensive list of farmers in corresponding districts. Among 25 farmers, in case of orchard, 20 farmers were selected for orchard of age ≥10 years and 5 farmers were selected for orchard in establishment stage, 4 to 6 year of orchard and 7 to 9 year of orchard. In addition,

45 other stakeholders *i.e.*, commission agent, wholesaler, retailer etc. (five from each agricultural commodity) were selected randomly. Further, 18 experts from institutions i.e. Research station, KVK personnel etc. were randomly selected for all the selected commodities under consideration for this study. Thus total sample size of this present study was 393 as indicated in fig. 3.1. A survey approach was adopted to collect both quantitative and qualitative data. A structured and semi- structured interview schedule was designed and developed for the study. The primary data was collected by interviewing the respondents and the secondary sources were used to enrich the primary data and analysis.

3.4 Variables and their measurement

3.4.1 Selection of variable and their measurement

The appropriate variables for the present study were identified based on the objectives of the study, review of literature and discussion with experts. Details of the variables and their measurements were mentioned in Table 3.4.1 and 3.4.2.

Table No. 3.4.1 List of selected variables and their measurements

No.	Variables	Measurement	Level of measurement
I. Socio-personal variables			
1.	Age	Chronological age (in years)	Ratio
2.	Educational status	No. of years of formal education	Ratio
3.	Family size	Number of family members	Ratio
4.	Experience	Number of years engaged in farming or processing	Ratio
5.	Training received	Number of training received and its duration	Ratio
6.	Land size	Actual land owned in acres	Ratio
7.	Extension contact	Schedule developed	Ordinal
Objective 1			
8.	Entrepreneurial Behaviour	TechnoNet Asia (1981) scale used	Ordinal
9.	Entrepreneurial	Schedule Developed	Nominal/ Ordinal

	Environment		
Objective 2			
10.	Production cost	Rs./unit	Ratio
11.	Net Price received	Selling price (Rs/unit)- Processing charges (Rs/unit)- Total Marketing cost (Rs/ unit)- Raw material cost (Rs/unit)	Ratio
12.	Yield	Q/ unit	Ratio
13.	Rate of produce	Rs/Q	Ratio
14.	BEP at yield and price	Q/unit & Rs/Q	Ratio
15.	BC ratio	-	Ratio
16.	Price Spread	Rs/ unit	Ratio
17.	Marketing efficiency	Sherpherd's Index/ Acharya's Index	Ratio
18.	Share in Consumers price	Rs/Q	Ratio
Objective 3			
19.	Training Need Assessment of Entrepreneurs	Scale developed	ordinal
Objective 4			
20.	Driving Forces and Resisting Forces	Modified scale of Gills (2015) used	Ordinal
21.	Strategies to promote VCD	Schedule developed	Ordinal

Table 3.4.2 List of selected entrepreneurial variables and their measurements

S. No.	Variables	Measurement	Level of measurement	Expected relation
1	Risk Taking Ability	TechnoNet Asia (1981)	Ordinal	+
2	Achievement motivation	Ray (1974) scale	Ordinal	+
3	Hope of Success	TechnoNet Asia (1981)	Ordinal	+

4	Innovativeness	TechnoNet Asia (1981)	Ordinal	+
5	Scientific Orientation	Modified Supe (1969) scale	Ordinal	+
6	Persuadability	TechnoNet Asia (1981)	Ordinal	+
7	Resiliency	Modified Gail M. Wagnild and Heather M. Young (1987) scale	Ordinal	+
8	Autonomy	Modified Paul E. Spector and Suzy Fox (1999) scale	Ordinal	+
9	Locus of control	Schedule developed	Ordinal	+
10	Proactive	Modified Esther R. Greenglass (1999) scale	Ordinal	+
11	Self-Efficacy	Ralf Schwarzer and Martthias Jerusalem (1995)	Ordinal	+
12	Entrepreneurial Creativity	Schedule Developed	Ordinal	+
13	Manageability	TechnoNet Asia (1981)	Ordinal	+
14	Critical Thinking	Modified Mincemoyer, Perkins, and Munyua (2001) scale	Ordinal	+
15	Inquisitiveness	Lee and Ashton Personality Inventory (2004)	Ordinal	+
16	Persistence	TechnoNet Asia (1981)	Ordinal	+
17	Feedback usage	TechnoNet Asia (1981)	Ordinal	+
18	Knowledge	TechnoNet Asia (1981)	Ordinal	+

3.4.2: Operationalisation and Measurement of Selected Variables

3.4.2.1. Socio-personal profile

1. Age: Age was measured as the number of chronological years completed by the respondent at the time of investigation. The respondents were classified on following three categories based on the census report of GOI (2011).

Category	**Age limit**
Young	Up to 35 years
Middle-aged	36-50 years
Old	more than 50 years

2. Education: It was operationally defined as the level of formal education attained by an individual respondent. The respondents were categorized into different categories as below:

Category	Score
Illiterate	0
Functionally literate	1
Primary	2
Middle	3
Secondary	4
Higher Secondary	5
Graduate and above	6

3. Experience: It referred to the actual number of years of experience spent by the respondent in farming or processing. The response was further categorized by using Cumulative Cube Root Frequency (CCRF) as low, medium and high.

4. Land holding: It was operationally defined as the total number of hectares of land owned and leased in by respondents, at the time of investigation. The respondents were classified into landless, marginal, small, semi-medium, medium and large categories as follows:

Category	Score
Landless	0 ha
Marginal	<1 ha
Small	1-2 ha
Semi-medium	2-4 ha
Medium	4-10 ha
Large	>10 ha

5. **Family size:** It gives the idea about strength of family that can be utilize for processing or farming purpose. The respondents were classified into small, medium and large family size on the basis of Cumulative Cube Root Frequency (CCRF).

6. **Training Received:** It was operationally defined as the total number of trainings received by the processor for value addition and farmers for package of practices etc. The response was further categorized by using Cumulative Cube Root Frequency (CCRF) as low, medium and high.

7. **Extension contact** It was operationally defined as degree to which the respondent maintained contacts with scientist at research station, trainers from different training institutes, extension professionals, agriculture officers, etc. in order to get information and technical assistance regarding processing and farming. The frequency of contact with extension professionals was measured through a three-point continuum viz., frequently, sometimes and never with scores of 3, 2 and 1, respectively.

3.4.2.2 Entrepreneurial behaviour and environment

1) **Entrepreneurial behaviour:** According to Bird and Schjoedt, (2009) Entrepreneurial behaviour is the study of human behaviour involved in identifying and exploiting opportunities through creating and developing new ventures as well as exploring and creating opportunities while in the process of emerging organizations. Thus, in present manuscript, entrepreneurial behaviour was operationally defined as the personality traits possessed by entrepreneur (processor) and farmer to run their firm in competing environment by considering all risk, opportunity, aspiration etc. Thus, 18 variables of entrepreneurial behaviours were considered for the study. Mainly, the scale developed by Technonet Asia (1981) was used in seven point continuum to determine entrepreneurial behaviour of processors and farmers through semantic differential technique.

i. **Risk taking**: It can be conceptually defined as the ability of processors and farmers to take the risk through adopting any technology or action in uncertain

environment. Scale developed by Technonet Asia (1981) was used in a seven point continuum

ii. **Hope of success**: The degree to which an individual perceives the advantageous outcome from one's behavior. Entrepreneurs take into consideration both existing opportunities and threats.. A successful entrepreneur remains positive about the outcome but at the same time keeps an eye on the negatives. Scale developed by Technonet Asia (1981) was used in a seven point continuum.

iii. **Manageability**: Degree to which an individual tries to attain his entrepreneurial goal using available resources efficiently and effectively. Scale developed by Technonet Asia (1981) was used in a seven point continuum.

iv. **Critical thinking**: Degree to which an individual uses reasoning in the establishment of belief system. Entrepreneurs examine the situations and conditions to its totality. Modified scale of Mincemoyer, C. Perkins, Munyua (2001) was used in a seven point continuum to measure the variable.

v. **Scientific orientation:** Degree to which an individual is inclined towards logical reasoning, testing and applying new techniques and practices. Modified scale of Supe (1969) was used in a seven point continuum.

vi. **Persuadable**: Degree to which an agri-entrepreneur is able to influence the decision pattern of an individual in the predetermined direction. This is the ability to link, convince and influence other individuals, agencies and other groups in order to maintain business contacts at a high level. Scale developed by Technonet Asia (1981) was used in a seven point continuum

vii. **Resiliency**: Degree to which an individual is able to overcome the mental stress that arises due to occurrence of negative events related to his/her agri-business. It is an ability to recover quickly from disruptive change without being overwhelmed or acting in dysfunctional or harmful ways. Modified scale developed by Gail M. Wagnild and Heather M. young (1987) was used in a seven point continuum.

viii. **Autonomy**: Degree to which an individual uses own ideas and decisions then plan his own course of action to meet entrepreneurial goals. Entrepreneurs have the ability to act its own. Modified scale of Paul E. Spector and Suzy Fox (1999) was used in a seven point continuum.

ix. **Proactive**: Degree to which an individual acts in advance to deal with an expected change or difficulty. It is the characteristic where entrepreneurs identify opportunities in advance and act on them. Modified scale of Esther R. Greenglass (1999), was used in a seven point continuum.

x. **Inquisitiveness**: Entrepreneurs have the tendency to inquire so as to satisfy their curiosity, eager to investigate and learn the things. Lee and Ashton Personality Inventory (2004), was used in a seven point continuum.

xi. **Self- efficacy**: Degree to which an agri-entrepreneur has belief in his/her ability to complete the tasks and rich goals. Modified scale developed by Ralf Schwarzer and Martthias Jerusalem (1995) was used in a seven point continuum.

xii. **Knowledge:** It is the degree to which an individual perceives himself to be competent in the technical and management aspect of running his venture. Scale developed by Technonet Asia (1981) was used in a seven point continuum.

xiii. **Innovativeness:** It is the degree to which an individual adopts new ideas relatively earlier than others in his social system. Scale developed by Technonet Asia (1981) was used in a seven point continuum.

xiv. **Achievement motivation:** McClelland, (1961) defined achievement motivation as a social value that emphasizes a desire for the excellence in order for an individual to attain a sense of personal accomplishment. It is the urge to improve oneself and excel in relation to a goal. Scale developed by Ray (1974) was used in a seven point continuum.

xv. **Persistence**: It is the degree to which the respondent perceives himself to take repeated or different actions to overcome the obstacles. Scale developed by Technonet Asia (1981) was used in a seven point continuum

xvi. **Feedback usages** It is the degree to which an individual productively uses the information on his venture to manage his resources better and achieve higher profits. Scale developed by Technonet Asia (1981) was used in a seven point continuum

xvii. **Entrepreneurial creativity**: the degree to which an entrepreneur uses imagination or original ideas to create something. Schedule was developed to measure entrepreneurial creativity

xviii. Locus of control: The degree to entrepreneurs believe that they have control over the outcome of events in their lives, as opposed to external forces

Semantic differential techniques: The type of a rating scale designed to measure the connotative meaning of objects, events, and concepts (Osgood, 1957). The connotations are used to derive the attitude towards the given object, event or concept. In present study, the entrepreneurial behaviour of processors and farmers were analysed following this method on seven point continuum. For semantic differential technique, the entrepreneurial behaviours (18 variables) were categorized into Evaluative, Potency and Activity (EPA) through restricted factor analysis following Principal Component Analysis (PCA) extraction method with normalized varimax rotation and polychoric correlation. Due to restricted factor analysis only three factors having eigen value more than 1 from both the groups (farmers and processors) were considered. From rotated component matrix, the variable having value more than 0.4 were selected in each three factors *i.e.*, Evaluative, Potency and Activity (EPA). The variables under each factor were averaged then D- statistics (distance statistic) was calculated to see the difference between farmers and processors.

$$Dij = \sqrt{\sum d_{ij^2}}$$

Where D = linear distance between any two concepts, i and j, and d is the algebraic difference between the coordinates of I and j on the same factor (EPA)

2) Entrepreneurial Environment: Entrepreneurial environments are defined as factors which are critical in developing entrepreneurship in certain regions (Gnyawali & Fogel, 1994). Thus, entrepreneurial environment for promoting value chain development conceptualized to be comprised of various factors like institutional, technical, marketing, infrastructure, legal and financial aspects within the boundaries of the firm and is of direct interest to an individual's decision-making behaviour in the system. The respondents were categorized using cumulative cube root frequency into strongly agree, Agree, Uncertain, Disagree, Strongly disagree for each factors.

3.4.2.3. Economics of agricultural commodities production

The economics of fruit production *i.e.*, orchard was analyse into two parts viz., establishment costs and operational costs. The establishment costs included land preparation and its layout, digging and filling of pits, planting materials cost, cost of pesticides, manure, fertilizer etc. and fencing. While recurring and maintenance costs included the expenditure on manuring (farm yard manure and fertilizer), interculture, irrigation, plant protection, pruning and cutting, opportunity cost (rental value of land), depreciation on fixed investment and interest on fixed and working capital. The cost of cultivation has been included in ANNEXURE I.

The economics of vegetables and food grain was calculated based on operational cost and fixed cost. The operational cost included seed, fertilizers, manures, pesticides, weedicides, irrigation charges, labour charges, interest on working capital @ 4 % (KCC interest rate) etc. The fixed cost included rental value of land, interest on fixed capital @ 10 %, depreciation on farm implements and building etc.

The cost of processing was calculated based on methodology followed by National Small Industrial Corporation (NSIC) under Ministry of Micro, Small and Medium Enterprise. The processing cost has been included in ANNEXURE II

1. **Depreciation and interest:** For estimating annual cost, the depreciation has been worked out for 6 months in case of food grain and vegetable and for 1 year in case of fruits @ 10 per cent per annum at the fixed investment by applying straight line method or direct method. Further, interest rate has been calculated @ 10% on fixed cost and 4% on operation cost (as per KCC interest rate).
2. **Amortization of Fixed Cost:** The annual amortization of cost was computed from the investment made on orchard up to the first flowering (*i.e.*, for the first 3 years of aonla and guava plantation and first 5 years of mango plantation) stage, assuming that the rate of interest to be 10 per cent and the expected economic life of aonla orchard (30 years), guava (25 years) and mango (50 years).

   Thus, annual amortization cost was worked out using the compounding cost formula and by adding it to maintenance cost for estimating the annual cost of cultivation of orchard of respective farm groups:

$$I = P\frac{i(1+i)\text{^}n}{(1+i)\text{^}n - 1}$$

where,
I = Annual sum (in Rs),
P = Present sum (in Rs),
I = Interest rate (10 % per annum), and
n = Economic life of the orchard (in years).

3. **Gross return:** Total value of produce is referred to as the gross return.
4. **Net return:** Net return obtained by subtracting the total cost from gross return**.**
5. **Marketing margin**: This refers to the costs and net share to the different market functionaries who are involved in the marketing of the produce.
6. **Producer's share in the consumer's rupee**: Refers to the farmer's net price expressed as percentage of the retail price of Potato.
7. **Price spread:** Refers to the difference between the net price the farmer received and retailer price of the produce.
8. **Break-even point:** Break-even point indicates a situation where farmers neither earn profit nor in loss. In other word break-even points is a point where total cost meet total return plotted on a graph sheet. Break-even points were obtained as follow:

$$\text{BEP (yield)} = \frac{\text{Total Fixed Cost} + \text{Total Variable cost}}{\text{Rate of produce}}$$

$$\text{BEP (price)} = \frac{\text{Total Fixed Cost} + \text{Total Variable cost}}{\text{Yield}}$$

9. **Benefit-Cost Ratio (BCR):** Benefit cost ratio is the ratio between gross return to the total cost. This was used for evaluating the project or investment by comparing its economic benefits with its economic costs. This ratio indicates the return from one unit of cost.

$$\text{BCR} = \frac{\text{Gross Present value of income (B)}}{\text{Gross Present value of cost (C)}}$$

$$BCR = \sum_{i=1}^{n} \frac{Bn}{(1+n)^n} \div \sum_{i=1}^{n} \frac{Cn}{(1+n)^n}$$

Where;
BCR= Benefit cost ratio

Bn= Benefit in the n years
Cn= Cost in the n years
i= Rate of interest used for discounting

10. Market efficiency: Marketing efficiency is directly related to the cost involved in moving goods from the producer to the consumer and the quantity of services offered. If the cost incurred when compared with the services involved, is low, it will be efficient marketing. To measure the marketing efficiency of identified market two methods were used.

i) Shepherd's Method

$$\text{MEI} = \frac{\text{V}}{\text{I}} - 1$$

MEI= Marketing Efficiency Index
V= value of goods sold/ consumer price of goods
I= Total marketing cost present in particular channel

ii) Acharya's method

$$\text{MEI} = \frac{\text{Net Price Received by Farmer}}{\text{TMM} + \text{TMC}}$$

MEI= Marketing Efficiency Index
TMM = Total Marketing Margin
TMC = Total Marketing Cost

3.4.2.4. Training need assessment of processor to upgrade value chain

Training need is the difference between "what is" and "what should be" in terms of incumbents knowledge, skills, attitude and behaviour in the given situation and time. Training is a systematic process which involves improvement of knowledge and skills in order to help the participants to function effectively and efficiently in their given task on completion of the training. In the present study, processors are involved in processing of agricultural commodities at varying levels (local to national). So there is need to identify the training needs of processors involved in processing to provide the requisite training to meet their present and future requirements. Thus the scale was developed following Likert method of summated rating (1932) to identify the training need of processors as it proposes opportunities to select statements based on their discriminating power. The compatibility of the Scale for the study is due to its nature of the most universal

method for survey approach of data collection as well as the responses are easily quantifiable and subjected to statistical computation. The following procedures were considered for identification of the training needs of processors:

a) **Defining the construct**: A construct is a concept with added meaning, deliberately and consciously invented or adopted for a special scientific purpose (Kerlinger, 1973). In the present study, the construct was identifying training needs of processors for processing agricultural commodities to enhance their competency for value chain development.

b) **Identification and operationalization of dimensions under the construct**: Major dimensions identified under this construct were Marketing (product, price, place and promotion), Technical (input, infrastructure, finance, legal and managerial), Information and Social Responsibility.

c) **Collection of items:-**Items simply means the statements representing each dimension of construct under study. Items related to the training needs of processors involve in processing of agricultural commodities were collected and developed based on review of literature, consultation with the experts from Division of Agricultural Extension, Indian Agricultural Research Institutes, Ministry of Food Processing, Central Institute of Post-Harvest Engineering and Technology, Krishi Vigyan Kendras and also based on the field experience of researcher. A tentative list of 135 statements consisting 100 positive and 35 negative statements were enlisted keeping in view the suitability of statements to the study area.

d) **Editing of items:-** The statements collected were cautiously edited by following the 14 informal criteria suggested by Edwards (1957). Thus, a total of 110 statements were taken out of 135 statements.

e) **Relevancy test of items:-** Finally the 110 statements on a five point continuum *viz.*, Most relevant, Somewhat relevant, Relevant, Least relevant and Not relevant with the score of 5,4,3, 2 and 1, respectively and reverse for the negative statements were mainly sent by Google form survey and some were handed over personally to the total of 55 judges. The experts were from ICAR institutions, Agricultural Extension Division, and scientists of Centre for Agricultural Technology Assessment and Transfer. The judges were requested to

make necessary modifications and addition or deletion of items if required. A total of 34 responses were obtained in time out of 55. The Relevancy Weightage (RW) and Mean Relevancy Score (MRS) were worked out for all the selected indicators individually by using the following formula:

$$Relevancy\ weightage = \frac{(\text{Most relevant} \times 5) + (\text{Somewhat relevant} \times 4) + (\text{Relevant} \times 3) + (\text{Least relevant} \times 2) + (\text{Not relevant} \times 1)}{\text{Maximum possible score}}$$

$$Mean\ relevancy\ score = \frac{(\text{Most relevant} \times 5) + (\text{Somewhat relevant} \times 4) + (\text{Relevant} \times 3) + (\text{Least relevant} \times 2) + (\text{Not relevant} \times 1)}{\text{Number of judges}}$$

Finally the statements having relevancy weightage of more than 0.82 and mean relevancy score of 4.14 or more than 4.14 were selected for item analysis. As a result, a total of 60 statements selected for the item analysis.

f) Item analysis:- Item analysis is a critical step for the construction of valid and reliable scale by using Likert's rating technique of measurement. The item analysis is done to find those items that form an internally consistent scale and to remove those items that do not (Spector, 1992). The item analysis provides information about how well each individual item relates to the other items in the analysis. The 60 items which were selected after expert relevancy test were administered to a random sample of 40 processors in non-sample area. The items were rated on five point continuum from 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree' with score of 5, 4, 3, 2 and 1, respectively for positive statements and reverse for negative statements. The overall score for each individual judge was computed by summing up the scores over all items.

g) **Computation of 't' values:-** For computation of t value, the 60 items selected through judges opinion were administered to a random sample of 40 processors from non-sample area. Based on total individual score, the judges were arranged in descending order. Upper and lower 25 per cent of the judges *i.e.*, 10 respondents (processors) of non-sample area with the highest total score and 10 of non-sample area processors with the lowest total score were selected. These two groups used as criterion groups to evaluate the discrete statements. The t value is

a measure of the extent to which a given statement discriminates between the high and low groups of respondents for each statement was calculated by using the formula given by Edwards (1957).

$$t = \frac{\overline{X}_H - \overline{X}_L}{\sqrt{\frac{\sum(X_H - \overline{X}_H)^2 + \sum(X_L - \overline{X}_L)^2}{n(n-1)}}}$$

Where, $\sum(X_H - \overline{X}_H)^2 = \sum(X_H)^2 - \frac{(\sum X_H)^2}{n}$ and $\sum(X_L - \overline{X}_L)^2 = \sum(X_L)^2 - \frac{(\sum X_L)^2}{n}$

$\overline{X}_H$= Mean score of given statement in high group
$\overline{X}_L$= Mean score of given statement in low group
$\sum(X_H)^2$= Sum of squares of individual score on a given statement for high group
$\sum(X_L)^2$= Sum of squares of individual score on a given statement for low group
$\sum X_H$ =Summation of scores on given statement for high group;
$\sum X_L$ = Summation of scores on given statement for low group

h) Final selection of item: Critical ratio ('t'- value) of each statement was calculated for the final selection of items. Items or statements were selected on the basis 't' value equal to or, more than 1.75 as this 't' value significantly differentiating between high and low groups of items. Therefore, 40 statements including 23 positive and 17 negative statements were retained in the final scale for measuring training needs of processors involved in processing for value chain development as shown in ANNEXURE III. Both positive and negative statements were considered to reduce the effects of social desirability and positive response bias.

(i) Standardisation of the scale: The present scale was standardised through reliability and validity which was ascertained using split half method as well as Cronbach's alpha and content validity, respectively.

(i.a) Reliability of scale: Reliability of the testing instrument is the ability to give consistent, stable and accurate measurement score in repetitive testing with same instrument. It helps in assessing the homogeneity of items in scale.

The split half method is used to check the reliability of the present scale in which a scale is divided into two halves based on even and odd number of statements. The Pearson product moment correlation between odd and even scores was 0.647. This coefficient indicates split half reliability of scale. To

adjust the split half reliability in to full test reliability, Spearman- Brown (1910) prophecy formula was used which is as follows:

$$R=\frac{2r}{1+r} = \frac{2\times0.647}{(1+0.647)} = 0.785$$

Where, R= Reliability coefficient of the whole scale
r = Pearson correlation between two halves

The whole test reliability was found to be 0.785 and significant at 1 per cent level of significance. Since the reliability coefficient of whole scale was more than 0.7, the present scale was considered to be highly reliable. Split half method is a widely held method of assessing reliability of a test mainly due to its benefit of single administration of the test and use of one sample. The major limitation of this method is there could be several ways of splitting a test and each method of split-half gives a different value of reliability. Rudner *et al.* (2002) observed that split-half reliability is a function of how the test was split. A solution to the problem is provided by Cronbach's alpha which is interpreted by many researchers as the average of all possible split-half correlations (Cortina, 1993). Cronbach's alpha also assumes that average covariance among non- parallel items is equal to the average covariance among all parallel items. Thus in present study Cronbach's alpha coefficient was also calculated and found to be 0.855 which means scale was good and consistent in measurement.

(i.b) Validity of scale: Validity means ability of an instrument to measure what one intended to measure. The developed scale was tested for content validity. According to Kerlinger (1987) content validity of scale is the representative or sampling adequacy of the content, the substance, the matter and the topics of a measuring instrument. There are several methods to quantify the degree of experts' agreement towards content relevancy of a scale. The paper considered the most acceptable method as suggested by Lynns' in 1986. For quantifying the content validity, the 40 selected statements ('t' value >1.75) were given to 6 experts (processors). The 6 experts were selected, as with increase in number of experts, the likelihood of achieving total agreement decreases. The 4-point scale was used to avoid a neutral and ambivalent midpoint as per Davis (1992) 1= not relevant, 2 = somewhat relevant, 3= quite relevant and 4= highly relevant. Then for each selected statements Content Validity Index *i.e.*, I-CVI calculated to check its relevance to the underlying

construct (ANNEXURE III). Then for computation of Content Validity Index for overall scale (S-CVI) worked out. The S-CVI/Ave which means the average of the I-CVIs for all the items of scale calculated to be 0.930. Thus, 93.00 per cent of items were judged to have high content validity as per the Lynn's criteria for excellent content validity: I-CVI= 1.0 with 3 to 5 experts and a minimum I-CVI of 0.78 for 6 to 10 experts as well as SCVI/Ave ≥ 0.90.

j) Administration of the scale: The final scale consisted of 40 statements which would measure the training need of processors for processing of agricultural commodities to enhance the competency for value chain development. The scale was administered on a five point continuum viz., strongly agree, agree, undecided, disagree and strongly disagree with a score of 5,4,3,2 and 1, respectively for positive statements and reverse scoring for negative statements. The overall score of the individual respondent towards training need of processors for processing of agricultural commodities could range from 40-200.

3.4.2.5. Driving and restraining forces for processors and farmers

Through Kurt Lewins' Force Field Analysis, driving and restraining forces were identified for both farmers and processors. The driving forces for both processors and farmers were identified through review of literature, expert opinion. Then for standardizing it, reliability and validity was calculated. Thus the reliability coefficient as per Spearman Brown for driving forces among processors was 0.90 and Cronbach's alpha to be 0.79. The content validity S-CVI/Ave was worked out to be 0.91.which indicates the high reliability and validity of schedule. Whereas, the reliability coefficient as per Spearman Brown for driving forces among farmers was 0.91 and Cronbach's alpha to be 0.76. The content validity S-CVI/Ave was worked out to be 0.91.which indicates the high reliability and validity of schedule.

To analyse the restraining forces for processors and farmers the scale developed by Gills (2015) was used with modification. Thus, for its standardization, reliability and validity was calculated. Thus the reliability coefficient as per Spearman Brown for restraining forces among processors was 0.95 and Cronbach's alpha to be 0.92. The content validity S-CVI/Ave was worked out to be 0.90.which indicates the high reliability and validity of scale. Whereas, the reliability coefficient as per Spearman Brown for restraining forces among farmers was 0.96 and

Cronbach's alpha to be 0.85. The content validity S-CVI/Ave was worked out to be 0.92.which indicates the high reliability and validity of scale.

For Force Field Analysis, the scores of driving and restraining forces were calculated and compared among processors as well as between processors and farmers. Further, the significance was checked through suitable statistics i.e. Mann Whitney U test and Wilcoxon Sign test.

3.4.2.6. Devising strategy to promote value chain through Alfares Method (2009)

The strategies to promote value chain were identified through review of literature and experts' opinion. Then the identified strategies were ranked through interview schedule from 18 judges of organizations using Alfares and Duffuaa (2009) methodology which is based on linear rank-weight linear function whose slope (Sn) depends on the number of criteria (n). This linear relationship specifies the average weight for each rank (r) for an individual judge (m), assuming a weight of 100% for the first-ranked (most important) factor. To determine criteria weight even from single judge is difficult as it is difficult to assign relative weights to different decision criteria. Naturally, it becomes more tedious to obtain criteria weights from several decision makers. Quite often, judges are much more comfortable in simply assigning ordinal ranks to the different criteria under consideration. Thus, the beauty of Alfares and Duffuaa method is to convert the criteria rank given by judges into relative criteria weights, in addition, assigning 100 % to rank 1 and subsequently as the rank decreases the percentage will decrease.

In present study to determine aggregate criteria weights of each dimensions or statement, the 18 judges ranked the statements within each dimension as well as each dimension. Thus, after obtaining aggregate weights, one can identify the important aspect of strategy development to promote value chain.

$$\mathrm{Sn} = 3.19514 + \frac{37.75756}{n}$$

$$\mathrm{Wrn} = 100 - \mathrm{Sn}(\mathrm{r} - 1)$$

Where,

n= number of criteria
r= rank assign to statement or criteria
Wrn= weight assign to criteria based on individual rank
W= aggregate weight of respondent

3.5 Statistical tools used in analysis

After data collection, the data were tabulated, analyzed and interpreted in the light of objectives of the study. The following statistical techniques were used for analysis of the data:

1) **Frequency and Percentage:** Frequency is the number of occurrences. In statistics the frequency (f_i) of an event i is the number n_i of times the event occurred in the experiment or the study.

$$\text{Percentage} = \frac{f_i}{\sum_{i=1}^{n} f_i} \times 100$$

2) **Arithmetic Mean (A.M.):** The mean is the value arrived at by dividing the sum of observations by the total number of observations.

$$\bar{X} = \frac{\sum X_i}{N}$$

Where,

X_i= Sum of each of the individual comparisons
i= 1, 2, 3…..N
N = Number of observation
$\bar{X}$ = Mean

3) **Standard Deviation (SD):** The Standard deviation is defined as the square root of the mean of the squared deviations of individual values from their mean. The formula used for standard deviation was as under

$$S.D. = \sqrt{\frac{\sum (Xi - \overline{X})}{N}}$$

Where,

Xi = Values of every cell entries
X = Mean of overall cell entries
N = Number of observations

4) **Independent-Samples t-test:** Independent-Samples t-test is used to determine if two sets of data are significantly different from each other or not. The formula used for this purpose is as follows:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{S_1}{n_1}^2 + \frac{S_2}{n_2}^2}}$$

Where,

$\overline{X}_1$ = mean of sample 1
$\overline{X}_2$ = mean of sample 2
n_1 = number of subjects in sample 1
n_2 = number of subjects in sample 2

$$S_1{}^2 = \text{variance of sample 1} = \frac{\sum(X_1 - \overline{X}_1)^2}{n_1}$$

$$S_2{}^2 = \text{variance of sample 2} = \frac{\sum(X_2 - \overline{X}_2)^2}{n_2}$$

5) **Mann–Whitney U test:** It was used for two independent samples. This test is used to compare the means of two independent samples.

6) **Friedman's test for related samples:** It is a non-parametric statistical test for testing whether samples originate from the same distribution. It is used for comparing more than two samples that are related. When the Friedman's test leads to significant results, then at least one of the samples is different from the other samples. The test statistic is given by $Q = \frac{SS_k}{SS_e} : \chi^2_{(k-1)}$, where k is the number of related groups, $SS_k = n\sum_{j=1}^{k}\left(\frac{\sum_{i=1}^{n} r_{ij}}{n} - \frac{\sum_{i=1}^{n}\sum_{j=1}^{k} r_{ij}}{nk}\right)^2$ and $SS_e = \frac{1}{n(k-1)}\sum_{i=1}^{n}\sum_{j=1}^{k}\left(r_{ij} - \frac{\sum_{i=1}^{n}\sum_{j=1}^{k} r_{ij}}{nk}\right)^2$, r_{ij} represents the rank of jth observation from group i.

7) **Kruskal–Wallis one-way analysis of variance for independent samples:** It is a non-parametric method for testing whether samples originate from the same distribution. It is used for comparing more than two samples that are independent, or not related. The parametric equivalence of the Kruskal-Wallis test is the one-way analysis of variance (ANOVA). The factual null hypothesis is that the populations from which the samples originate have the same median. When the Kruskal-Wallis test leads to significant results, then at least one of the samples is different from the other samples. It is an extension of the Mann–Whitney U test for comparing 3 or more groups. The test statistic (for large sample) is

$$K = \frac{12}{N(N+1)} \sum_{i=1}^{g} n_i \left(\frac{\sum_{j=1}^{n_i} r_{ij}}{n_i} - \frac{N+1}{2} \right)^2$$ which follows a χ^2 distribution with (g-1) degrees of freedom, where g is the number of groups n_i is the number of observations in i^{th} group, r_{ij} is the rank (among all observations) of jth observation from group i and N is the total number of observations across all groups.

8) **Wilcoxon signed-rank test: It** is a non-parametric statistical hypothesis test used to compare two related samples, matched samples, or repeated measurements on a single sample to assess whether their population mean ranks differ (i.e. it is a paired difference test). It can be used as an alternative to the paired Student's t-test, *t*-test for matched pairs, or the *t*-test for dependent samples when the population cannot be assumed to be normally distributed. A Wilcoxon signed-rank test is a nonparametric test that can be used to determine whether two dependent samples were selected from populations having the same distribution.

9) **Kendall's coefficient of concordance**: It is a non-parametric statistic. It is a normalization of the statistic of the Friedman test, and can be used for assessing agreement among judges. It measures the extent of association among several (three or more) sets of ranking of events, objects and individuals.

$$\mathrm{W} = \frac{12S}{K^2(N^3 - N)}$$

Where,

W= Coefficient of concordance

S= sum of square of deviations from mean

K= number of judges

N= number of items ranked

10) **Hierarchical Agglomerative Clustering (HAC):** It was used to cluster the types of processors for training need. It is a bottom-up approach, it starts by adding a cluster for each of the observations to be clustered, followed by iterative pair-wise merging of clusters until only one cluster is left at the top of the hierarchy. For clustering the different processors in each dimension (Market, Technical, Information and Social responsibility) of training need, ward method following Euclidean distance was used as it is based on minimum variance or error sum of square within cluster. Means within the cluster there was similarity

for that dimension of training need and between the clusters dissimilarity. The graphical representation of HAC is called dendrogram which is tree like structure, starting with groups of leaves form branches, branches merge into limbs and eventually into tree.

Chapter-4

RESULTS

This chapter includes the results obtained after analysis of collected data from processors (agripreneurs) and producers of different agricultural commodities under consideration. The objective wise presentation of results and its interpretation were presented under the following sub-heads:

4.1 Socio-personal profile of processors and farmers

4.2 Comparison of entrepreneurial behaviour of processors and farmers

4.3 Assessing the entrepreneurial environment to promote value chain

4.4 Comparison of profitability between farmers and processors for selected agricultural commodities

4.5 Identifying marketing channels and work out the price spread for agricultural commodities

4.6 Development of value chain maps for nine agricultural commodities

4.7 Identification and comparison of training needs among processors to upgrade their value chain

4.8 Clustering of processors with respect to various dimension of Training Need Assessment (TNA)

4.9 Identification of driving and restraining forces among processors as well as between processors and farmers

4.10 Devising strategies to promote value chain among farmers

4.1 Profile of processors and farmers in terms of their socio-personal characteristics

The socio-personal characteristics of processors and farmers were analysed and presented below.

4.1.1 Comparison of age between processors and farmers

Table 4.1.1: Comparison of age between processors and farmers

Category (Years)	Processors (n=135) *f (%)*	Farmers (n=180) *f (%)*
Young (up to 35years)	48 (35.56)	7 (3.89)
Middle-aged (36-50yrs)	66 (48.89)	95 (52.74)
Old (above 50yrs)	21 (15.55)	78 (43.33)

Table 4.1.1 indicates that high percentage of processors (35.56%) belonged to young age group. In old age group, percentage of farmers (3.89%) was higher (43.33%) compared to processors (15.55%). The majority of processors (48.89%) and farmers (52.74%) fall in middle age group (36-50 years).

4.1.2 Comparison of level of education between processors and farmers

Table 4.1.2: Comparison of education level between processors and farmers

Category	Processors (n=135)		Farmers (n=180)	
	f	*%*	*f*	*%*
Illiterate	3	2.22	19	10.55
Functional literate	4	2.96	40	22.22
Primary	5	3.70	41	22.78
Middle	6	4.44	36	20.00
Secondary	11	8.14	26	14.44
Senior Secondary	33	24.44	15	8.33
Graduate and above	73	54.07	3	1.67

Table 4.1.2 shows that majority (54.07%) of processors were graduate and twenty four per cent had passed senior secondary. However, majority of farmers were up to primary level, twenty per cent were up to middle level and fourteen per cent were up to secondary level.

4.1.3 Distribution of average processors and average farmers based on experience

Table 4.1.3: Distribution of average processors and average farmers based on experience

Category (Years)	Processors (n=135)		Category (Years)	Farmers (n=180)	
	f	%		*f*	%
Very low (<15)	112	82.96	Very low (<27)	111	61.67
Low (15-21)	8	5.92	Low (27-37)	43	23.89
Medium (21-30)	7	5.18	Medium (37-47)	18	10.00
High (30-42)	7	5.18	High (47-61)	6	3.33
Very high (>42)	1	0.74	Very high (>61)	2	1.11

Table 4.1.3 indicated that majority (82.96 %) of processors were having very low experience of less than 15 years as well as majority of farmers were having very low experience of less than 27 years. Around twenty three per cent of farmers were having low experience.

4.1.4 Comparison of land holding between average processors and average farmers

Table 4.1.4: Comparison of land holding between average processors and average farmers

Category	Processors (n=135)		Farmers (n=180)	
	f	%	*f*	%
Landless	0	0	1	0.56
Marginal	87	64.44	129	71.67
Small	23	17.03	30	16.67
Semi-medium	8	5.92	10	5.56
Medium	7	5.18	7	3.89
Large	10	7.40	3	1.67

Table 4.1.4 indicates that majority of processors (64.44 %) and farmers (71.66 %) had marginal landholding. Around sixteen per cent were belonged to

small land holding category whereas seven per cent of processor and one per cent of farmers were belonged to large land holding category.

4.1.5 Comparison of training received between average processors and average farmers

Table 4.1.5: Comparison of training received between average processors and average farmers

Category (Numbers)	Processors (n=135) *f (%)*	Farmers (n=180) *f (%)*
No training	47 (34.81)	136 (75.55)
One training	70 (51.85)	41 (22.78)
More than one training	18 (13.34)	3 (1.67)

It was found that majority (51.85%) of processors had received one training related to food processing or entrepreneurship, 34.81 per cent of processors received no training whereas 13.34 per cent received at two or more training as revealed from Table 4.1.5. In case of farmers, majority (75.55%) of them had received no training, 22.78 per cent had received one training and only 1.67 per cent had received more than one training.

4.1.6 Comparison of family size between average processors and average farmers

Table 4.1.6: Comparison of family size between average processors and average farmers

Category (Numbers)	Processors (n=135) *f (%)*	Farmers (n=180) *f (%)*
Low (<4)	62 (45.93)	48 (26.66)
Medium(5-6)	41 (30.37)	47 (26.11)
High (>7)	32 (23.70)	85 (47.22)

It was found that majority (45.93%) of processors had low family size, 30.37 per cent had medium family size and 23.70 per cent had high family size as depicted

from Table 4.1.6. However, in case of farmers, majority (47.22%) were having high family size.

4.1.7 Comparison of extension contact between average processors and average farmers

Table 4.1.7: Comparison of extension contact between average processors and average farmers

Category	Processors (n=135) *f (%)*	Farmers (n=180) *f (%)*
Never	28 (20.74)	42 (23.33)
Sometime	76 (56.29)	82 (45.56)
Frequently	31 (22.96)	56 (31.11)

The majority of processors and famers had good contact with personnel from institution, local leaders, friends, relatives etc. However, percentage of processors (56.29%) shared in extension contact was more compared to farmers (45.56 %) depicted from Table 4.1.7.

4.2 Comparison of entrepreneurial behaviour of processors and producer

Hypothesis 1

H_o: There was no significant difference between the entrepreneurial behaviour of fruit processors and fruit producers

$H_{1:}$ There was significant difference between the entrepreneurial behaviour of fruit processors and fruit producers

4.2.1 Comparison of entrepreneurial behaviour of fruit processors and fruit producer

To compare the entrepreneurial behaviour of fruit processors and fruit producers, the factor analysis was done following three restricted factors. The Principal Component Analysis (PCA) extraction method with normalized varimax rotation and polychoric correlation was followed. Significant KMO test statistic 0.84 and Bartlett's statistic 538.3 (df = 153; $p < 0.001$) were obtained for fruit processors. For fruit producers, KMO test statistic was found to be 0.68 and

Bartlett's statistic 287.9 (df = 120; p< 0.001) which was significant. Due to restricted factor analysis only three factors having eigen value more than 1 from both the group were considered. Through rotated component matrix, the variable having value more than 0.4 were selected in each three factors i.e. Evaluative, Potency and Activity (EPA). In case of fruit processors, all the variables had value was more than 0.4 whereas in case of fruit producers, two variables were dropped (namely persuadable and locus of control) as their values were less than 0.4.

Table 4.2.1: Distribution of entrepreneurial behaviour into EPA Factors based on restricted factor analysis for fruit processors and fruit producers

Fruit Processors			**Fruit Producers**		
Evaluative	**Potency**	**Activity**	**Evaluative**	**Potency**	**Activity**
Resiliency Locus of control Self-efficacy Creativity Manageability Critical thinking Inquisitiveness Persistence Feedback Knowledge	Achievement motivation Innovativeness Scientific-orientation Persuadable	Risk taking Hope of success Autonomy Proactive	Risk taking Hope of success Self-efficacy Creativity Knowledge	Innovativeness Scientific-orientation Autonomy Manageability Critical-thinking Inquisitiveness Persistence Feedback	Achievement - Motivation Resiliency Proactive

Table 4.2.2: Comparison of EPA scores of fruit processors and fruit producers

Concepts	**Scores in Major Dimensions**		
	Evaluative	**Potency**	**Activity**
Fruit Processors (n=45)	5.44	5.20	4.65
Fruit Producers (n=60)	3.53	3.56	2.91

$$D_{pf(fruit)} = \sqrt{(5.44-3.53)^2+(5.2-3.56)^2+(4.65-2.91)^2}$$
$$= +3.06$$

Table 4.2.3: Comparing entrepreneurial behaviour of fruit processors and fruit producer of total EPA variables through Mann Whitney U test

Particular	Respondent	No. of Variables	Mean rank	Mann-Whitney U	Wilcoxon W	Z
Entrepreneurial Behaviour	**Processors**	18	25.22	4.5 (p<0.001)	140.5	-4.814
	Producers	16	8.8			

Table 4.2.1 and 4.2.2 indicates that for fruit processors, evaluative factor includes 10 entrepreneurial behaviour variables with the average score of 5.44. The potency and activity factors include five and four variables, respectively with the average score of 5.20 and 4.65. Similarly, in case of fruit producers, evaluative, potency and activity scores were 3.53, 3.56 and 2.91, respectively. D-statistic (Distance statistic) calculated between fruit processors and producers were 3.06. Mann Whitney U test was performed to find out whether there is any significant difference between processors and producer. Significant difference in the entrepreneurial behaviour of fruit processors (25.22) and fruit producers (8.8) was found at test statistic ($U=4.5$, $p<0.001$) (Table 4.2.3). Hence, null hypothesis was rejected and alternate hypothesis was accepted.

The semantic differential chart graphically represents the difference between fruit processors and fruit producers depicted from Fig. 4.2.1. For risk taking, both the group got similar mean value, as producers were also seen taking moderate risk like processors. It was observed that many of fruit producers were not following scientific approach and new technology of orchard cultivation as well as found to be less curious and indifferent in nature. Thus, they scored mean value less than processors for entrepreneurial behaviour like innovativeness, scientific orientation, inquisitiveness, resilience, autonomy, critical thinking etc. However, it was noticed that processors were in search of new technology, information and they critically think before implementing any new approach and were seen to manage properly, patiently even in adverse condition. It was noticed that they have high will power, do not get easily influenced by external factors, utilize even negative feedback in a positive manner, and wish to do things differently than others.

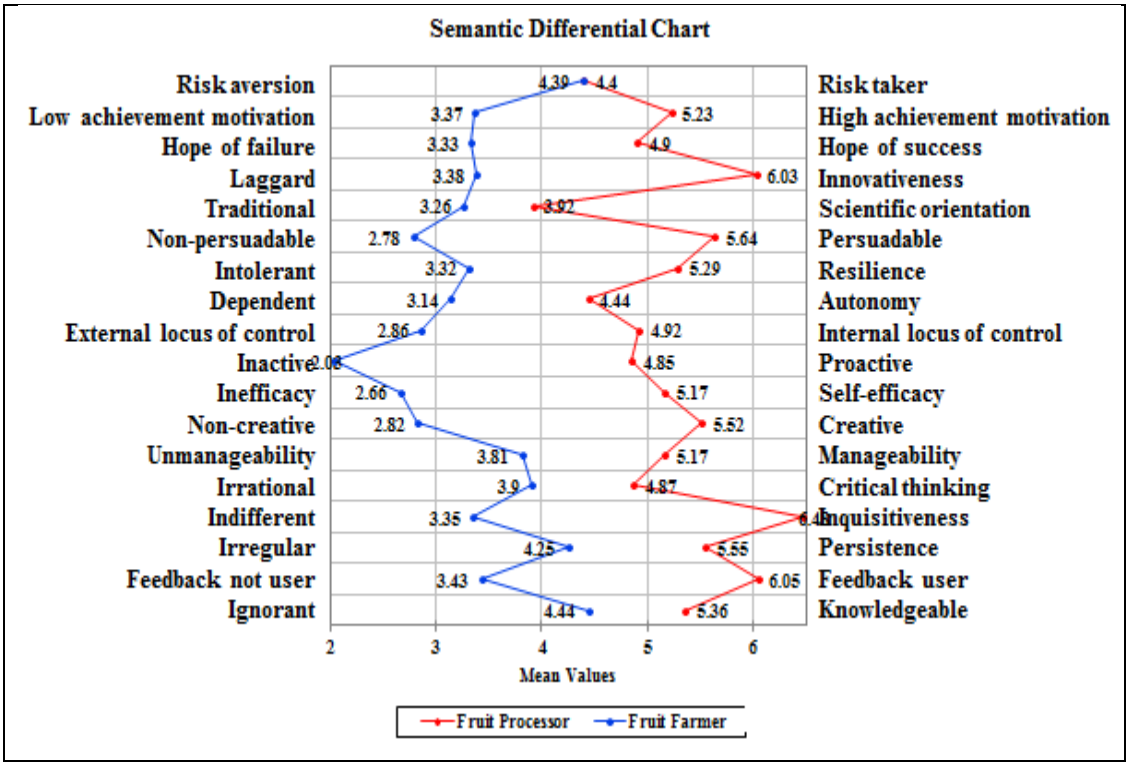

Figure 4.2.1: Representation of entrepreneurial behaviour between fruit processors and fruit producers through semantic differential chart

4.2.2. Comparison of entrepreneurial behaviour of vegetable processors and vegetable producers

Hypothesis 2

H_o: The vegetable producers possessed more entrepreneurial behaviour than vegetable processors

H_1: The vegetable producers possessed less entrepreneurial behaviour than vegetable processors

The restricted factor analysis was done to compare the entrepreneurial behaviour of vegetable processors and producers following principal component analysis extraction method with normalized varimax rotation and polychoric correlation. The obtained KMO test statistic 0.83 and Bartlett's statistic 551.6 (df = 136; P <0.001) was significant for vegetable processors. For vegetable producers, KMO test statistic (0.65) and Bartlett's statistic 415.3 (df = 153; P < 0.001) was also found to be significant. Due to restricted factor analysis only three factors having eigen value more than 1 from both the groups were considered. From rotated component matrix, the variables having value more than 0.4 were selected in each

three factors *i.e.*, Evaluative, Potency and Activity (EPA). In case of vegetable producers all the variable value was more than 0.4 whereas in case of vegetable processors, one variable was dropped (namely persistence) due to value less than 0.4.

Table 4.2.4: Distribution of entrepreneurial behaviour into EPA Factors based on restricted factor analysis for vegetable processors and vegetable producers

Vegetable Processors			Vegetable Producers		
Evaluative	**Potency**	**Activity**	**Evaluative**	**Potency**	**Activity**
Achievement-motivation Innovativeness Inquisitiveness Knowledge	Risk taking Hope of success Scientific-orientation Persuadable Locus of control	Resiliency Autonomy Proactive Self-efficacy Creativity Manageability Critical thinking Feedback	Achievement motivation Persuadable Locus of control Proactive Self-efficacy Feedback	Scientific-orientation Autonomy Critical thinking Inquisitiveness Persistence	Risk taking Hope of success Innovativeness Resiliency Creativity Manageability Knowledge

Table 4.2.5: Comparison of EPA scores of vegetable processors and vegetable producers

Concepts	Scores in Major Dimensions		
	Evaluative	**Potency**	**Activity**
Vegetable Processors (n=45)	5.45	5.05	5.11
Vegetable Producers (n=60)	2.56	3.91	3.62

$D_{pf(vegetable)} = \sqrt{(5.45-2.56)^2+(5.05-3.91)^2+(5.11-3.62)^2}$

$= +3.45$

Table4.2.6: Comparing entrepreneurial behaviour of vegetable processors and vegetable producers of total EPA variables through Mann Whitney U test

Particular	Respondent	No. of Variables	Mean rank	Mann-Whitney U	Wilcoxon W	Z
Entrepreneurial Behaviour	Processors	17	26.47	9 ($p<0.001$)	180	-4.753
	Producers	18	10.00			

From Table 4.2.4 and 4.2.5 it is evident that for vegetable processors, evaluative factor included four entrepreneurial behaviour variables with the average score of 5.45. The potency and activity factors included five and nine variables, respectively with the 5.05 and 5.11, respective average scores. Similarly, in vegetable producers' case, Evaluative, potency and activity average scores were 2.56, 3.91 and 3.62 respectively. Then, D-statistic (Distance statistic) calculated between vegetable processors and producers and found to be 3.45. The significant difference in the entrepreneurial behaviour of vegetable processors (26.47) and vegetable producers (10.00) was found through Mann Whitney test (U=9, p<0.001) as evident from table no 4.2.6. Therefore, null hypothesis was rejected and alternate hypothesis was accepted. So, it can be concluded that vegetable processors possessed more entrepreneurial behaviour than vegetable producers.

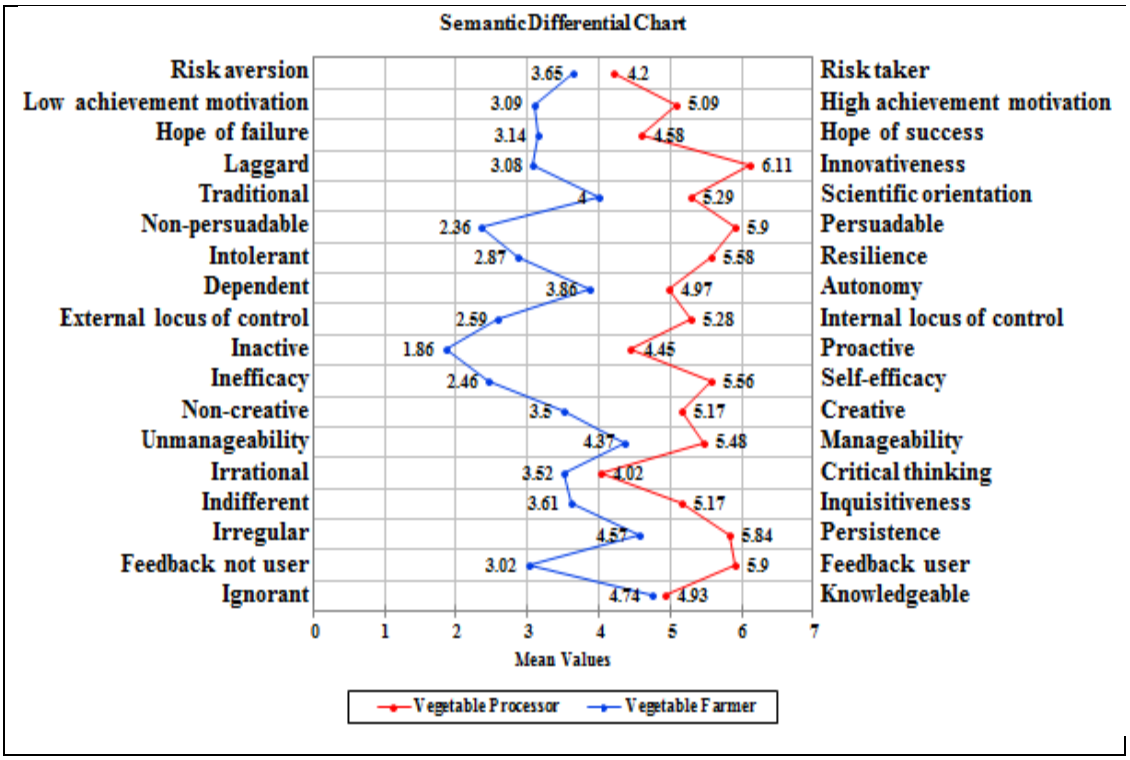

Figure 4.2.2: Entrepreneurial behaviour of vegetable processors and vegetable producers through semantic differential chart

In case of vegetable producers, it was observed that producers were having knowledge regarding cultivation of vegetable *i.e.*, mushroom, tomato (within net house) and potato depicted from fig. 4.2.2. Vegetable producers were innovative (3.08), scientifically oriented (4), autonomous (3.86), manageable (4.37), persistent (4.57) but these entrepreneurial behaviours were relatively less among producers

compared to the processors. The processors were found to be more innovative (6.11), scientifically oriented (5.29), resilient (5.58), possess internal locus of control (5.28) etc. because processors were inquisitive towards marketing, creative towards their value addition, took the feedback always in positive way and highly motivated towards achievement.

4.2.3 Comparison of entrepreneurial behaviour of food grain processors and food grain producers

Hypothesis 3

H_o: The entrepreneurial behaviour of food grain processors was lower than food grain producers

$H_{1:}$ The entrepreneurial behaviour of food grain processors was higher than food grain producers

To compare the entrepreneurial behaviour of food grain processors and producers, firstly, restricted factor analysis was done into three factors following Principal Component Analysis, extraction method was undertaken with normalized varimax rotation and polychoric correlation. Thus, obtained KMO test statistic 0.84 and Bartlett's statistic 302.9 (df = 45; P < 0.001) was significant for processors. For food grain producers, KMO test statistic was found to be 0.62 and Bartlett's statistic was 332.6 (df = 136; P <0.001) which was significant. Due to restricted factor analysis, only three factors having eigen value more than 1 from both the group were considered. From rotated component matrix, the variable having value more than 0.4 were selected in each of the three factors *i.e.*, Evaluative, Potency and Activity (EPA). In case of food grain processors, ten variables were having values more than 0.4 however, in case of food grain producers, only one variable was dropped (namely self- efficacy) due to less than 0.4 value.

Table 4.2.7: Distribution of entrepreneurial behaviour into EPA Factors based on restricted factor analysis for food grain processors and food grain producers

Food grain Processors			Food grain Producers		
Evaluative	**Potency**	**Activity**	**Evaluative**	**Potency**	**Activity**
Risk taking Persuadable Feedback	Innovativeness Scientific orientation	Achievement motivation Autonomy	Scientific-orientation Persuadable	Innovativeness Resiliency Manageability	Risk taking Achievement motivation

Knowledge	Critical thinking Inquisitiveness		Autonomy Proactive Creativity	Knowledge	Hope of success Locus of control Critical-thinking Inquisitiveness Persistence Feedback

Table 4.2.8: Comparison of EPA scores of food grain processors and food grain producers

Concepts	Scores in Major Dimensions		
	Evaluative	**Potency**	**Activity**
Food grain Processors (n=45)	5.92	5.53	6.15
Food grain producers (n=60)	2.53	3.51	2.93

$D_{pf(food\ grain)} = \sqrt{(5.92-2.53)^2+(5.53-3.51)^2+(6.15-2.93)^2}$

$= +5.09$

Table 4.2.9: Comparing entrepreneurial behaviour of food grain processors and food grain producers of total EPA variables through Mann Whitney U test

Particular	**Respondent**	**No. of Variables**	**Mean rank**	**Mann-Whitney U**	**Wilcoxon W**	**Z**
Entrepreneurial Behaviour	Processors	9	22.22	7 (p<0.001)	178	-3.808
	Producers	18	9.89			

Table 4.2.7 and 4.2.8 indicated that for food grain processors, Evaluative, Potency and Activity average scores found to be 5.92, 5.53 and 6.15, respectively. Similarly, in case of food grain producers, Evaluative, Potency and Activity average scores were 2.53, 3.51 and 2.93, respectively. Then, D-statistic (Distance statistic) calculated between food grain processor and producer was found to be 5.09. The significant difference in the entrepreneurial behaviour of average processors and average producers was seen from Table 4.2.9 at test statistic (U= 7; p<0.001). Therefore, null hypothesis was rejected. It can be inferred that entrepreneurial behaviour of food grain processors was higher than food grain producers.

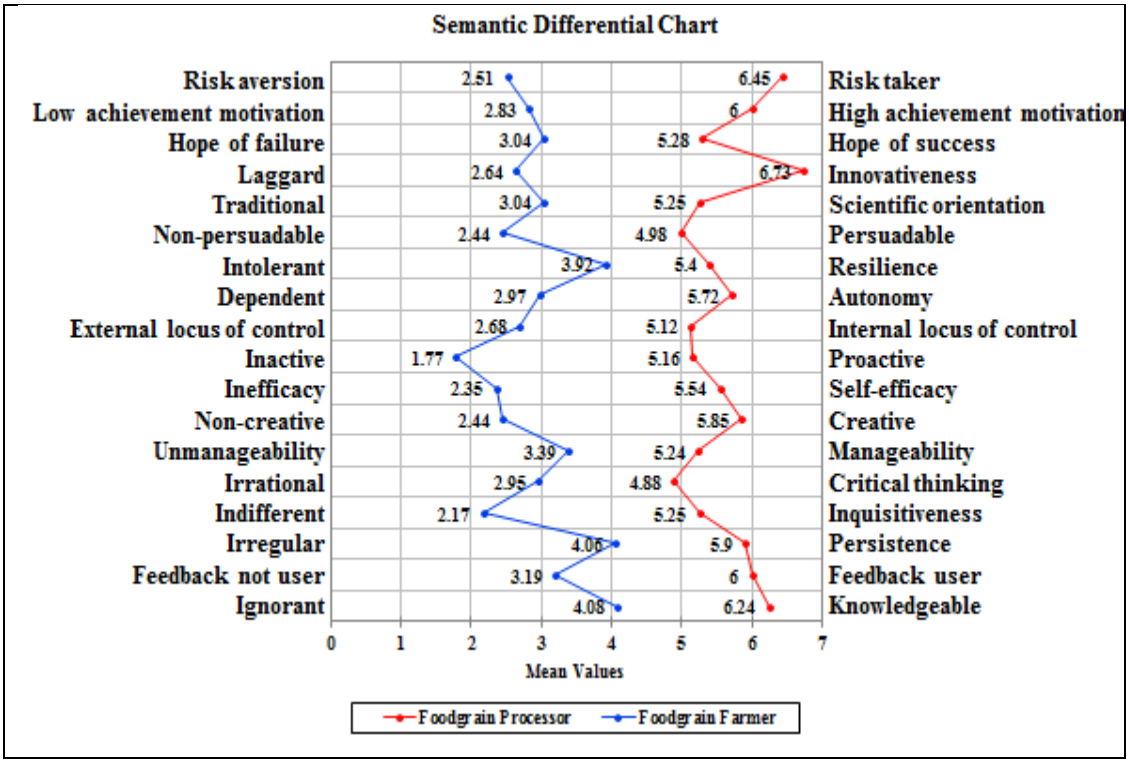

Figure 4.2.3: Representing the entrepreneurial behaviour of foodgrain processors and foodgrain producers through semantic differential chart

The fig. 4.2.3 represents that wide difference was observed between food grain processors and food grain producers because of low entrepreneurial behaviour of producers. Food grain producers preferred to take low risk (2.5), lacked innovativeness (2.64) and scientific approach (3.04) in cultivation of crop, had low inquisitiveness (2.17) towards new methods of farming but they were seen persistent (4.06), manageable (3.39), resilient (3.92) and knowledgeable (4.08) towards package of practices, so their farming was successful. However, food grain processors used to take more risk (6.45), highly motivated towards achievement (6), were innovative (6.73), scientific oriented (5.25), creative (5.85), took feedback in positive manner (6). Thus, wide difference was seen between processors and producers with respect to entrepreneurial behaviour.

4.2.4 Comparing entrepreneurial behaviour of average processors and average producers

Hypothesis 4

H_o: The entrepreneurial behaviour of average processors was lower than average producers

$H_{1:}$ The entrepreneurial behaviour of average processors was higher than average producers

To compare the entrepreneurial behaviour of average processors and average producers, firstly, restricted factor analysis was done into three factors following Principal Component Analysis extraction method with Normalized varimax rotation and polychoric correlation. Thus, obtained KMO test statistic 0.83 and Bartlett's statistic = 660.2 (df = 105; P < 0.001) was significant for average processors. For average producers, KMO test statistic was found to be 0.59 and Bartlett's statistic was 565.4 (df = 105; P = 0.001) which was significant. Due to restricted factor analysis only three factors having eigen value more than 1 from both the groups were considered. From rotated component matrix, the variable having value more than 0.4 were selected in each three factors i.e. Evaluative, Potency and Activity (EPA). In both the cases three variables were dropped due to less than .4 values.

Table 4.2.10: Distribution of entrepreneurial behaviour into EPA Factors based on restricted factor analysis for average processors and average producers

Processors			**Producers**		
Evaluative	**Potency**	**Activity**	**Evaluative**	**Potency**	**Activity**
Risk taking Achievement motivation Innovativeness Autonomy Proactive	Hope of success Resiliency Locus of control Manageability Persistence	Creativity Critical thinking Inquisitiveness Feedback Knowledge	Innovativeness Scientific orientation Autonomy Critical thinking Inquisitiveness Persistence	Risk taking Resiliency Creativity Knowledge	Achievement motivation Hope of success Locus of control Self-efficacy Feedback

Table 4.2.11: Comparison of EPA scores of average processors and average producers

Concepts	**Scores in Major Dimensions**		
	Evaluative	**Potency**	**Activity**
Processors (n=135)	5.39	5.30	5.34
Producers (n=180)	3.43	3.55	2.98

$D_{pf(average)} = \sqrt{(5.39-3.43)^2+(5.03-3.55)^2+(5.34-2.93)^2}$

$= +2.33$

Table 4.2.12: Comparing entrepreneurial behaviour of average processors and average producers of total EPA variables through Mann Whitney U test

Particular	**Respondent**	**No. of Variables**	**Mean rank**	**Mann-Whitney U**	**Wilcoxon W**	**Z**
Entrepreneurial Behaviour	Processors	15	23.0	2.00 (p<0.001)	120	-4.662
	Producers	15	8.0			

Table 4.2.10 and 4.2.11 indicated that for processors, Evaluative, Potency and Activity average scores found to be 5.39, 5.30 and 5.34, respectively. Similarly, in case of producers, Evaluative, potency and activity average scores were 3.43, 3.55 and 2.98, respectively. D-statistic (Distance statistic) calculated between average processors and average producers were found to be 2.33. The significant difference was found in the entrepreneurial behaviour of average processors (23) and average producers (8) through test statistic (U= 2; p<0.001) from Table 4.2.12. Thus, null hypothesis was rejected and alternate hypothesis was accepted. It can be concluded that entrepreneurial behaviour of average processors was higher than average producers.

The figure 4.2.4 represented graphically the average mean scores for entrepreneurial behaviour of average processors and average producers through semantic differential chart. Average producers possessed low risk (3.5), innovativeness (3.03), scientific orientation (3.43), inactive (1.89), external locus of control (2.71), low creative (2.92) and inquisitiveness (3.04) however, they were persistent (4.29), have knowledge about package of practice (4.42), manageable and resilient but compared to processors these behaviour hold low average scores. The average processors had high motivation towards achievement (5.44), were innovative (6.29), scientifically oriented (4.82), resilient (5.42), autonomous (5.04), inquisitive (5.63) and persistent (5.76). Thus, significant difference between average processors and average producers observed for entrepreneurial behaviour.

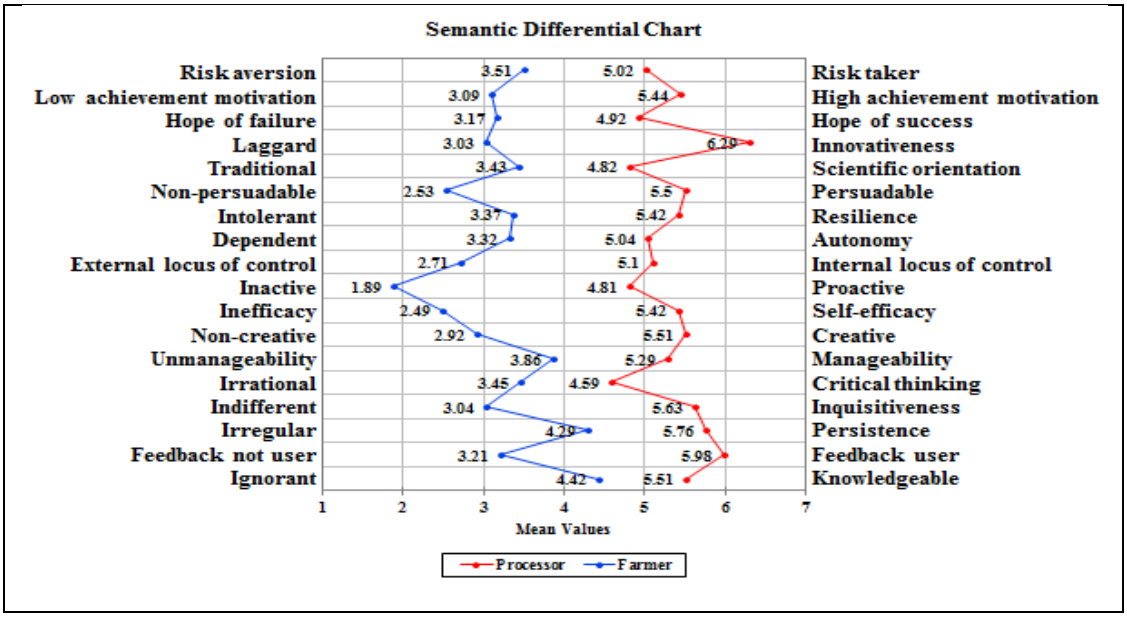

Figure 4.2.4: Representing the entrepreneurial behaviour of average processors and average producers through semantic differential chart

4.2.5 Comparing entrepreneurial behaviour among processors (fruit, vegetable and food grain)

Table 4.2.13: Distribution of EPA scores among three types of processors

Factors	Fruit Processors	Vegetable Processors	Food grain Processors
Evaluative	5.44	5.45	5.92
Potency	5.20	5.05	5.53
Activity	4.65	5.11	6.15
Total	15.29	15.61	17.6

D_{vf} = 0.493

D_{Fgf} = 1.61

D_{Fgv} = 1.23

(D_{vf} = Distance between vegetable processors and fruit processors;

D_{Fgf} = Distance between food grain processors and fruit processors;

D_{Fgv} = Distance between food grain processors and vegetable processors)

From Table 4.2.13 it can be inferred that food grain processors possessed more entrepreneurial behaviour followed by vegetable processors and then fruit processors. It was observed that there was slight difference (D_{vf} = 0.49) between

vegetable processors and fruit processors in entrepreneurial behaviour. Thus, the difference between entrepreneurial behaviour of food grain processors and fruit processors (D_{Fgf} = 1.61) was higher than entrepreneurial behaviour of food grain processors and vegetable processors (D_{Fgv} = 1.23).

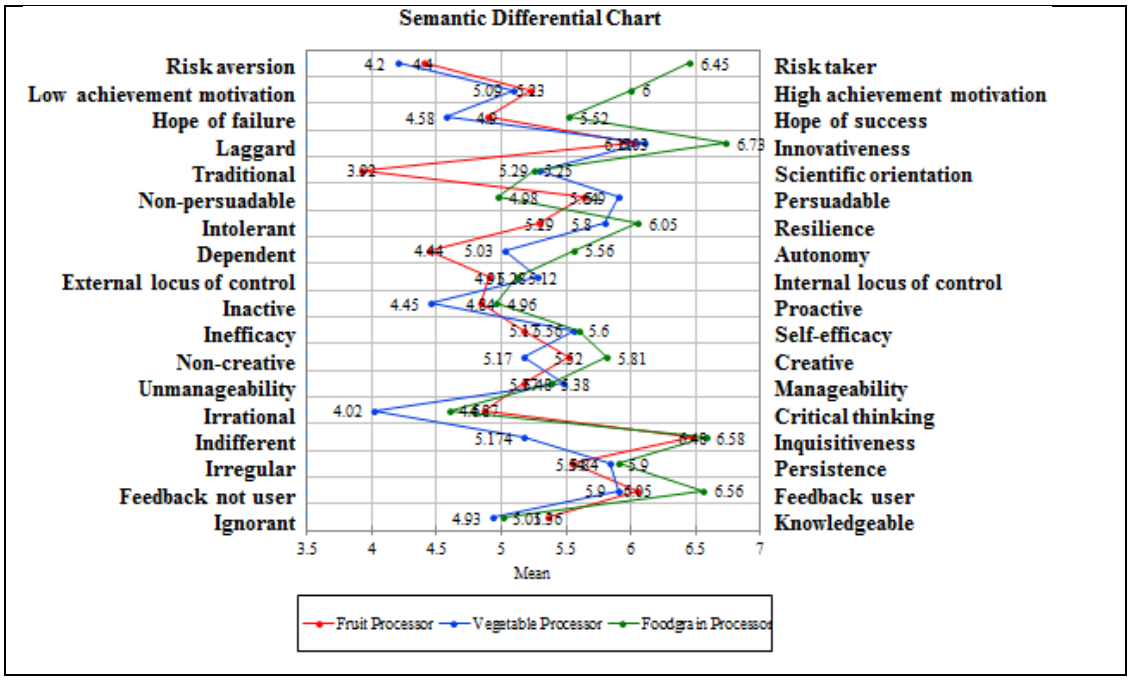

Figure 4.2.5: Representing entrepreneurial behaviour among processors (fruit, vegetable and food grain) through semantic differential

Figure 4.2.5 graphically represented the entrepreneurial behaviour among processors. The risk taking ability was more among food grain processors (6.45) compare to fruit (4.2) and vegetable processors (4.4) may be due to food grain enterprises were larger compared to other two. Among fruit processors (3.2) scientific orientation was found to be low compared to other as they do not follow much scientific approach due to lack of exposure to training and distant marketing. Many of fruit processors entered into business after learning processing techniques through friends, neighbours etc. and started selling locally. Thus, they lack scientific orientation. From table 4.2.13 shows total EPA score for food grain processors as high, thus, they possessed more entrepreneurial behaviour like innovativeness (6.73), hope of success (5.52), scientific orientation (5.25), achievement motivation (6), resilience (6.05) and utilize feedback in positive way (6.56).

4.3 Identifying the existing entrepreneurial environment to promote value chain

The factors of entrepreneurial environment were identified through review of literature and expert judgement to promote value chain development. The identified factors included broadly six dimensions i.e. Institutional, Market, Financial, Technical, Infrastructure and legal. The institutional dimension further categorized into government institutions, political, entrepreneurial education, family and religion. The opinion of respondents were taken on five point continuum i.e. 5 representing strongly agree to 1 strongly disagree. The data was analysed following cumulative cube root frequency.

4.3.1 Identifying the existing entrepreneurial environment to promote value chain among fruit processors

Table 4.3.1 (a): Institutional dimension of existing entrepreneurial environment among fruit processors

A	**Institutional Factor**					
	Mango Processor (n=15)		**Guava Processor (n=15)**		***Aonla* Processors (n=15)**	
1	**Government support**					
SDA	(<16)	13.33	(<10)	6.67	<25	13.33
DA	(16-20)	20	(10-18)	20	25-31	53.33
U	(20-25)	26.67	(18-19)	33.33	31-33	13.33
A	(25-30)	33.33	(19-22)	40	33-36	20
SA	(>30)	6.67	(>22)	0	>36	0
2	**Political Support**					
SDA	<6	33.33	<7	13.33	(<9)	6.67
DA	6-7	13.33	7-9	40	(9-11)	33.33
U	7-9	26.67	9-10	20	(11-13)	60
A	9-10	20	10-11	20	(13-14)	0
SA	>10	6.67	>11	6.67	(>14)	0
3	**Food processing courses or Entrepreneurial Education at school/ college**					
SDA	<7	6.67	<6	13.33	<9	26.67
DA	7-8	20	6-8	13.33	09-10	26.67
U	8-9	20	8-9	20	10-12	26.67
A	9-10	40	9-10	33.33	12-14	13.33
SA	>10	13.33	>10	20	>14	6.67
4	**Family support in enterprise**					
SDA	<5	6.67	<11	20	<7	0
DA	5-7	13.33	11-13	20	7-8	6.66
U	7-8	6.67	13-14	6.67	8-9	0

A	8-9	53.33	14-16	46.67	9-11	46.67
SA	>9	20	>16	6.67	>11	46.67
5	**Religion or caste based difference**					
SDA	<3	20	<5	6.67	<4	6.67
DA	3-5	33.33	5-6	20	4-6	20
U	5-6	26.67	6-8	53.33	6-7	13.33
A	6-8	13.33	8-9	20	7-8	46.67
SA	>8	6.67	>9	0	>8	13.33

Table 4.3.1(a) shows that in case of government institutional support, majority of mango (33.33%) and guava processor (40%) agreed that government support was existing for training etc., but majority (53.34 %) of *aonla* processors disagreed. The majority of mango (40%) and guava (33.33%) processors agreed for their exposure to entrepreneurial education and food processing courses at college or school level. In all the cases, processors agreed for family support in their enterprises. As fruit processors were having small processing units, thus, family members were seen to be involved. The caste based bias was noticed only in case of *aonla* processors (46%).

Table 4.3.1(b): Existing entrepreneurial environment for fruit processor in terms of marketing, finance, technical, infrastructure, legal and finance

B	**Marketing**					
	Mango Processors (n=15)		**Guava Processors (n=15)**		***Aonla* Processors (n=15)**	
SDA	<24	0	<22	13.33	<26	6.67
DA	24-27	6.67	22-29	20	26-30	6.67
U	27-29	13.33	29-31	6.67	30-31	13.33
A	29-32	46.67	31-34	53.33	31-35	53.33
SA	>32	33.33	>34	6.67	>35	20
C	**Financial**					
SDA	<17	6.67	>17	6.67	<17	6.67
DA	17-19	6.67	17-20	6.67	17-18	13.33
U	19-22	33.33	20-21	6.67	18-19	33.33
A	22-25	40	21-22	66.67	19-20	33.33
SA	>25	13.33	>22	6.67	>20	13.33
D	**Technical**					
SDA	<18	6.67	<15	13.33	<18	6.67
DA	18-20	13.33	15-16	13.33	18-19	13.33
U	20-21	13.33	16-17	33.33	19-21	20
A	21-22	46.67	17-19	20	21-22	33.33
SA	>22	20	>21	20	>22	26.67
E	**Infrastructure**					
SDA	<12	6.67	<19	0	<19	0

DA	12-18	13.33	19-20	20	19-21	26.67
U	18-19	6.67	20-21	13.33	21-22	20
A	19-21	53.33	21-22	46.67	22-25	33.33
SA	>21	20	>22	20	>25	20
F	**Legal**					
SDA	<14	6.67	<14	13.33	<11	20
DA	14-16	20	14-15	20	11-13	13.33
U	16-17	33.33	15-16	20	13-14	26.67
A	17-18	26.67	16-17	33.33	14-16	33.33
SA	>18	13.33	>17	13.33	>16	6.67

Table 4.3.1 (b) shows that majority of mango (46 %), guava (53.33 %) and *aonla* (53 %) processors agreed for marketing facility due to availability of direct marketing facility. For credit and infrastructure facility all processors were agreed. It was observed that facilities existed but timely access to credit and regularity was the problem especially, for subsidy. For technical facility, anola (46.67 %), followed by mango (33.33) and guava (20 %) processors were agreed due to timely access to raw material and labour. In case of legal factor, majority of processors (33 %) had registered their enterprises, issued required licences etc., but only after facing a lot of difficulties because of lack of information and transparency.

4.3.2 Identifying the existing entrepreneurial environment to promote value chain among vegetable processors

Table 4.3.2 (a): Institutional dimension of existing entrepreneurial environment among vegetable processors

A	**Institutional Factor**					
	Tomato Processors (n=15)		**Potato Processors (n=15)**		**Mushroom Processors (n=15)**	
1	**Government factor**					
SDA	<11	26.67	<13	33.33	<24	6.67
DA	11-17	40	13-15	40	24-30	6.67
U	17-20	6.67	15-17	6.67	30-34	13.33
A	20-23	20	17-20	20	34-35	53.33
SA	>23	6.67	>20	0	>35	20
2	**Political**					
SDA	<5	13.33	<4	13.33	<7	33.33
DA	5-9	53.33	4-7	80	7-9	13.33
U	9-11	26.67	7-8	0	9-12	40
A	11-13	0	8-15	6.67	12-14	13.33
SA	>13	6.67	>15	0	>14	0
3	**Food processing courses or Entrepreneurial Education at college/school**					
SDA	<3.5	20	<5	13.33	<9	6.67
DA	3.5-5.16	60	5-7	73.33	9-11	6.67

U	5.15-5.9	0	7-8	6.67	11-12	20
A	5.9-6.8	13.33	8-10	6.67	12-14	53.33
SA	>6.8	6.67	>10	0	>14	13.33
4	**Family**					
SDA	<10	33.33	<9	6.67	<7	6.67
DA	10-11	13.33	9-12	6.67	7-9	20
U	11-12	20	12-13	26.67	9-10	20
A	12-13	26.67	13-14	40	10-13	33.33
SA	>13	6.67	>14	20	>13	20
5	**Religion**					
SDA	<2	6.67	<2	6.67	<1.8	6.67
DA	2-4	53.33	2-4	60	1.8-6	60
U	4-5	26.67	4-5	6.67	6-7	13.33
A	5-7	13.33	5-6	20	7-9	6.67
SA	>7	0	>6	6.67	>9	13.33

Table 4.3.2 (a) indicates that more than half of mushroom processors (54 %) agreed for government support i.e. HAIC Development centre at Murthal Sonepat extending support to mushroom producers and processors whereas in case of tomato and potato (40 %) processors disagreed due to lack of government support for processing unit. Majority of processors disagreed for political pressure and religion or caste based differences (60%). Majority of mushroom processors (53%) agreed for existence of education related to food processing and agripreneurship, however, tomato (60 %) and potato processor (73 %) disagreed. Potato processors (40 %) were getting more family support in their processing in comparison to tomato (26 %) and mushroom (33 %) processors.

Table 4.3.2 (b) reveals that majority of mushroom processors (46 %) agreed for market facility of processed product to Delhi or NCR. However, tomato (40 %) and potato (46%) processors were disagreed with the existing marketing facility. It was found that many of the small processors were processing the agricultural commodities and then they were giving the commodities to big processors with brand name for marketing. Though, credit facility was available to all types of processors, availing subsidy on time was cumbersome. Potato processors (60 %) and tomato processors (53.33 %) disagreed with the existing technical facility due to lack of access to suitable raw material variety, but mushroom processors (60%) agreed with existing technical facility. Mushroom processors (53 %) were found to have more infrastructure support compared to other processors. Majority of potato processors (40 %) were unregistered and did not have licence due to their

unawareness. However, mushroom processors were authorized therefore; legal facilities were more available to them.

Table 4.3.2 (b): Existing entrepreneurial environment for vegetable processors in terms of marketing, finance, technical, infrastructure, legal and finance

	Tomato Processors (n=15)		Potato Processors (n=15)		Mushroom Processors (n=15)	
B	**Marketing**					
SDA	<19	13.33	<21	26.67	<30	6.67
DA	19-25	40	21-23	46.67	30-31	13.33
U	25-27	26.67	23-28	13.33	31-33	20
A	27-29	13.33	28-30	6.67	33-37	46.67
SA	>29	6.67	>30	6.67	>37	13.33
C	**Financial**					
SDA	<14	6.67	<9	6.67	<17-19	6.67
DA	14-18	13.33	9-13	26.67	19-20	20
U	18-24	33.33	13-14	40	20-22	13.33
A	24-29	40	14-16	20	22-24	53.33
SA	>29	6.67	>16	6.67	>24	6.67
D	**Technical**					
SDA	<10	13.33	<8	6.67	<20	0
DA	10-13	53.33	8-13	60	20-22	6.67
U	13-14	6.67	13-14	13.33	22-23	0
A	14-17	20	14-16	20	23-24	60
SA	>17	6.67	>16	0	>24	33.33
E	**Infrastructure**					
SDA	<10	6.67	<19	6.67	<22	0
DA	10-11	13.33	19-21	13.33	22-23	6.67
U	11-12	33.33	21-23	20	23-24	20
A	12-14	20	23-24	33.33	24-25	53.33
SA	>14	20	>24	20	>25	20
F	**Legal**					
SDA	<9	6.67	<10	13.33	<14	6.67
DA	9-11	13.33	10-14	40	14-15	6.67
U	11-12	40	14-16	26.67	15-17	0
A	12-13	20	16-18	13.33	17-18	66.67
SA	>13	20	>18	6.67	>18	20

4.3.3 Identifying the existing entrepreneurial environment to promote value chain among food grain processors

Table 4.3.3 (a): Institutional dimension of existing entrepreneurial environment among food grain processors

A	Institutional Factor					
	Maize Processors (n=15)		**Wheat Processors (n=15)**		**Soybean Processors (n=15)**	
1	**Government factor**					
SDA	<11	6.67	<1	6.67	<23	0
DA	11-21	20	18-19	13.33	23-27	6.67
U	21-26	20	19-20	13.33	27-29	13.33
A	26-31	40	20-21	46.67	29-31	53.33
SA	>31	13.33	>21	20	>31	26.67
2	**Political**					
SDA	<3	6.67	<7	13.33	<11.42	20
DA	3-5	13.33	7-8	6.67	11.42-12.27	40
U	5-7	46.67	8-9	46.67	12.27-13.14	20
A	7-8	26.67	9-10	26.67	13.14-13.57	20
SA	>8	6.67	>10	6.67	>13.57	0
3	**Entrepreneurial Education and food processing at college /school**					
SDA	<4	26.67	<6.4	6.67	<8.1	6.67
DA	4-6.5	33.33	6.4-6.8	13.33	8.1-10.16	13.33
U	6.5-6.8	6.67	6.8-8.5	26.67	10.16-10.88	33.33
A	6.8-9.7	26.67	8.5-9.3	33.33	10.88-10.93	40
SA	>9.7	6.67	>9.3	20	>10.93	13.33
4	**Family**					
SDA	<6	6.67	<11	13.33	<7.4	0
DA	6-7	13.33	11-12	6.67	7.4-7.8	26.67
U	7-9.25	20	12-13	20	7.8-9.3	66.67
A	9.25-11	33.33	13-14	33.33	9.3-11	6.67
SA	>11	26.67	>14	26.67	>11	0
5	**Religion**					
SDA	<3	6.67	<7.26	6.67	<5.42	0
DA	3-4	13.33	7.26-8.03	13.33	5.42-5.89	20

U	4-5	33.33	8.03-8.75	46.67	5.89-7.26	53.33
A	5-6	26.67	8.75-9	26.67	7.26-7.61	26.67
SA	>6	20	>9	6.67	>7.61	0

Table 4.3.3 (a) indicates that majority of soybean processors (53.33%) stated that they were getting assistance mostly from Centre of Excellence on Soybean Processing and Utilization, Bhopal, ICAR-Indian Institute of Soybean Research, Indore and Soybean Processing Association of India (SOPA), Indore. Majority of wheat processors (46%) agreed for government support from Indian Agricultural Research Institution (RS), Indore. Majority of maize processors (40 %) were getting assistance from Rajendra Prasad Agricultural University (RAU), Pusa and Agriculture College at Dholi. The majority of soybean (40 %) followed by wheat (33.33%) processors agreed for existence of entrepreneurial education and food processing courses. Mainly maize and wheat (33 %) processors agreed for family support in their enterprise. The processors (26 %) were of uncertain for caste based differences on choice of enterprise.

Table 4.3.3(b): Existing entrepreneurial environment for food grain processors in terms of marketing, finance, technical, infrastructure, legal and finance

B	**Marketing**					
	Maize Processors (n=15)		**Wheat Processors (n=15)**		**Soybean Processors (n=15)**	
SDA	<14	0	<26	13.33	<26	6.67
DA	14-24	13.33	26-27	20	26-29	13.33
U	24-26	20	27-29	0	29-30	6.67
A	26-29	60	29-31	33.33	30-31	53.33
SA	>29	6.67	>31	26.67	>31	20
C	**Financial**					
SDA	<8	13.33	<16	13.33	<16	6.67
DA	8-17	20	16-18	13.33	16-17	13.33
U	17-18	20	18-19	26.67	17-18	0
A	18-20	33.33	19-20	40	18-20	60
SA	>20	13.33	>20	6.67	>20	20
D	**Technical**					
SDA	<14	6.67	<14	6.67	<17	6.67
DA	14-16	6.67	14-15	13.33	17-18	6.67
U	16-19	6.67	15-17	33.33	18-19	26.67
A	19-21	66.67	17-18	26.67	19-21	40

SA	>21	13.33	>18	20	>21	20
E	**Infrastructure**					
SDA	<11	6.67	<18	6.67	<19	0
DA	11-13	33.33	18-20	13.33	19-22	6.67
U	13-15	20	20-21	33.33	22-23	20
A	15-17	26.67	21-22	40	23-25	40
SA	>17	13.33	>22	6.67	>25	33.33
F	**Legal**					
SDA	<10	20	<13	13.33	<14	0
DA	10-13	60	13-16	13.33	14-16	33.34
U	13-14	6.67	16-17	26.67	16-17	20
A	14-16	13.33	17-19	40	17-18	40
SA	>16	0	>19	6.67	>18	6.66

Table 4.3.3 (b) indicates that majority of maize processors (60 %) agreed for existence of market facility due to availability of distant as well as direct marketing facility. Wheat and soybean processors were also having favourable opinion towards marketing and financial facilities. Because of timely access to suitable raw material, variety and skilled labour, maize processors (66 %), soybean processors (40 %) and wheat processors (26) agreed for technical facility. Due to interrupted power supply, maize processors (33 %) disagreed with existence of infrastructure facility, however, wheat and soybean processors agreed with infrastructure facility. Majority of wheat (40 %) and soybean (40%) processors agreed with availability of legal facility for their enterprise registration and issuing licence. However, maize processors (13.33%) disagreed due to lack of transparency for issuing licence, renewal of enterprise registration, GST registration etc.

4.3.4 Ranking of processors based on existing supporting entrepreneurial environment

Table 4.3.4: Ranking of processors based on existing entrepreneurial environment

Processors	Insti-tution	Market	Finance	Tech-nical	Legal	Infra-structure	Total	Rank
Aonla	900	444	279	308	232	313	2476	III
Guava	797	335	286	246	211	263	2138	VI
Mango	705	376	280	306	247	241	2155	V
Tomato	656	351	243	172	167	171	1760	VIII

Potato	591	334	189	163	152	295	1724	IX
Mushroom	930	460	292	328	233	358	2601	I
Maize	691	370	227	259	178	219	1944	VII
Wheat	817	423	273	249	227	306	2295	IV
Soybean	951	431	310	286	241	313	2532	II

Based on mean score mushroom processor got first rank (2601) for existing entrepreneurial environment depicted from Table 4.3.4. After mushroom processor, entrepreneurial environment was promoting for soybean processor (rank II) followed by *aonla* processor (rank III). The lowest existing entrepreneurial environment was found for potato processor (rank IX) followed by tomato processor (rank VIII) and maize processor (rank VII).

4.4 Comparative profitability between processing unit and production unit in various selected agricultural commodities

The cost of production has been calculated for both processing and production units in each selected commodity which has been attached in appendix. For calculating cost of production for processing unit, National Small Industries Corporation (NSIC) methodology has been followed. Depreciation was worked out following Single Line Method (SLM) and 4 per cent interest rate was considered to calculate interest rate on working capital for farmers as per Kisan credit card interest rate. Thus, cost of production, net return, break-even point (BEP) and benefit cost (BC) ratio were calculated.

4.4.1 Comparative profitability between *aonla* processing unit and *aonla* production unit

The cost incurred in processing unit (Rs 7864.715/q) was much higher than production unit (Rs 252.92/q) due to high investment in machineries, utilities (power etc.), expenses (GST, storage, transportation etc.), labour charge etc. Though the investment (31.09 times) was more for processing unit, but net return was also higher in case of processing (Rs 6801.952/q) unit compared to production unit (Rs 949.57/q) revealed from Table (4.4.1). Thus, processing helps in realizing more income, increasing shelf life of product, reducing wastage etc. The rate of processed product (Rs 14666.67/q) was higher than raw *aonla* (Rs 1200/q), thus, income

earned was more for processing unit. The break-even point at price was achieved earlier than actual price for both the enterprises (production unit- 21 %; processing unit- 65%), indicated economic feasibility of units. The break even yield was achieved at 173.05 q (63%) for processing unit and 77.77 q (21%) for production unit. It was seen that in case of production unit, no profit and no loss point reached earlier due to low investment.

Table 4.4.1: Comparative profitability between *aonla* processing unit and *aonla* production unit

Particular	Processing unit (n=15)	Production unit (n=20)	Difference	Times
Cost (Rs/q)	7864.715	252.9481	7611.77	31.09
Net return (Rs/q)	6801.952	949.57	5852.38	7.16
Rate (Rs/q)	14666.67	1200	13466.67	12.23
BEP at Price (Rs/q)	9632.15 (65 %)	252.94 (21 %)		
BEP at Yield (Q/unit)	173.05 (63 %)	77.70 (21 %)		
BC ratio	1.80	4.80		

4.4.2 Comparative profitability between guava processing unit and guava production unit

In case of processing unit, cost incurred was much higher than production unit around 26 times due to high initial investment as well as high recurring cost. In addition, net income realized by processing unit (Rs 5732.88/q) was more than production unit (Rs 2317.22/q) from Table (4.4.2). The rate of processed products (Rs 16200/q) was more than raw guava (Rs 3300/q) thus, income earned was more in processing unit. The break-even point at price was 75 per cent and 73 per cent, respectively for processing and production unit respectively. However, the break-even at yield was achieved at 207.97q and 38.60q for processing and production unit respectively which were lower than actual yields. Thus, both the units were economically viable. The benefit cost ratio was lower for processing unit (1.6) than production unit (5.6) due to heavy investment in enterprise.

Table 4.4.2: Comparative profitability of guava processing unit and guava production unit

Particular	Processing unit (n=15)	Production unit (n=20)	Difference	Times
Production Cost (Rs/q)	10467.11	402.10	7611.76	26.03
Net return (Rs/q)	5732.88	2317.22	3415.65	2.47
Rate (Rs/q)	16200	3300	12900	4.90
BEP at Price (Rs/q)	12290.1 (75%)	402.10 (73.01%)		
BEP at Yield (Q/unit)	207.97 (78.38%)	38.60 (11.21 %)		
BC ratio	1.60	5.6		

4.4.3 Comparative profitability of mango processing unit and production unit

The cost incurred in processing unit (Rs 6308.99/q) was higher than production unit (Rs 1420.40/q) due to heavy investment in processing enterprise. The net return was also found to be more in processing unit (Rs 6557.67/q) than production unit (Rs 1379.59/q) depicted from Table 4.4.3. The cost incurred in processing unit was 4.44 times and net return was 4.75 times than production unit. The rate of fresh ripe mango (Rs 2800/q) was lower than the processed product (Rs 13600/q). Both the units were economically viable. The benefit cost ratio was more for processing unit (2.12) compared to production unit (1.9) due to more benefit per unit investment.

Table 4.4.3: Comparative profitability of mango processing unit and mango production unit

Particular	Processing unit (n=15)	Production unit (n=20)	Difference	Times
Cost (Rs/q)	6308.99	1420.40	4888.58	4.44
Net return (Rs/q)	6557.67	1379.59	518.08	4.75

Rate (Rs/q)	13600	2800	10800	4.85
BEP at Price (Rs/q)	13039.88 (95%)	1420.20 (50.72 %)		
BEP at Yield (Q/unit)	224.74 (74%)	46.02 (50.47 %)		
BC ratio	2.12	1.9		

4.4.4 Comparative profitability of processing and production unit for tomato

Table 4.4.4 shows that cost incurred in processing unit was 23.53 times and net return was 8.22 times of production unit. Thus, cost (Rs 6165.97/q) and net return (Rs 4422.91) of processing unit was more than production unit. The rate of processed product (Rs 11333.34/q) was more than fresh tomato (Rs 800/q). Therefore, processing leads to value addition in terms of money as well as products. The BEP at yield was at 71.63 per cent for processing unit and 28.75 per cent for production unit whereas BEP at price for processing unit was at 67.22 per cent and for production unit at 32.75 per cent. High BEP at price and yield was observed for processers due to more total cost of production and fixed cost than production unit. Hence, both processing and production units were economically viable. BC ratio was higher for producer compared to processing unit due to high cost of processing compared to cost of cultivation of tomato.

Table 4.4.4: Comparative profitability of processing and production unit for tomato

Particular	Processing unit (n=15)	Production unit (n=20)	Difference	Time
Production Cost (Rs/q)	6165.97	262.03	5903.94	23.53
Net return (Rs/q)	4422.91	537.96	3884.95	8.22
Rate (Rs/q)	11333.34	800	10533.34	14.16
BEP at Price (Rs/q)	7618.90 (67.22%)	262.03 (36.01%)		
BEP at Yield (Q/unit)	215.37 (71.63%)	209.25 (28.75%)		
BC ratio	1.74	3.41		

4.4.5 Comparative profitability of potato processing unit and production unit

The processing unit was found to incur more cost (Rs 6334.12/q) around 13.14 times than production unit (Rs 481.99/q). In addition, net return was higher for processing unit (nr=Rs 5710.30/q) as indicated in table 4.4.5. The rate was higher for processed product (Rs 11933/q) than raw potato (Rs 400/q)). In case of processing unit, BEP at price and yield (Rs 5841.23/q & Rs 338.91q) was lower than actual rate of product and yield (Rs 11933/q & 580q), thus, it can be inferred that the processing was economically viable. In case of production unit, BEP at yield and price was higher than actual average yield and price of potato at farm gate, thus, economically not viable. The benefit cost ratio was higher for processing unit than production unit, as producers benefit was too low even to meet cost of cultivation.

Table 4.4.5: Comparative profitability of potato processing and production unit

Particular	Processing unit (n=15)	Production unit (n=20)	Difference	Times
Production cost (Rs/q)	6334.12	481.99	5852.13	13.14
Net return (Rs/q)	5710.30	-166.04	5876.34	34.39
Rate (Rs/q)	11933.33	400.00	11533.33	29.83
BEP at Price (Rs/q)	5841.23	710.55		
BEP at Yield (Q/unit)	338.91	259.20		
BC ratio	2.65	0.66		

4.4.6 Comparative profitability of processing and production unit for mushroom

Table 4.4.6 shows that processing unit had high cost incurred (1.41 times) and net return (1.47 times) than production unit. In addition, the rate of processed product (Rs 9246.32/q) was higher in processing unit. The break-even point at yield and price was achieved at 81.56 and 79.27 per cent in case of processing unit and at 76.74 and 78.07 per cent in case of production unit. The benefit cost ratio was slightly higher processing unit compared to production unit.

Table 4.4.6: Comparative profitability of processing and production unit for mushroom

Particular	Processing unit (n=15)	Production unit (n=20)	Difference	Times
Cost (Rs/q)	7201.53	5074.78	2126.74	1.41
Net return (Rs/q)	2098.72	1425.21	673.51	1.47
Rate (Rs/q)	9246.32	6500	2746.32	1.42
BEP at Price (Rs/q)	7330.47 (79.27%)	5074.78 (78.07%)		
BEP at Yield (Q/unit)	2991.734382 (81.56%)	87.493638 (76.74%)		
BC ratio	1.39	1.28		

4.4.7 Comparing the profitability of maize processing unit and production unit

Table 4.4.7 shows the huge difference for cost incurred in production unit (Rs 9617.41/q) and processing unit (Rs 1196.99/q) was observed due to heavy investment in processing like machinery cost, GST, other expenses and utilities, labour charge etc. However, net return of processing unit (Rs 13991.66) was 58.53 times more than production unit (Rs 239.07/q) as well as rate of processed products was 5 times higher than fresh maize. Thus, it can be inferred that processing adds value in terms of income as well as leads to product diversification. In addition, processing reduces post-harvest losses and increases shelf life of raw material. It was observed that fluctuation in price was more in raw material compared to finished products. The benefit cost ratio was found more in processing unit (2.32) than production unit (1.14) as benefit per unit investment was higher in processing. In case of processing unit, the break-even point at yield (3450.2q) was lower than actual yield (3722.67q) which indicated economic feasibility of processing unit. However, in case of production unit, break even yield (309.8q) was higher than actual yield (291.42q), thus, indicated production unit as not economically viable. As per break-even price both the units where economically viable. The study suggests enhancing the productivity of maize through new technology in order to reach at no profit and no loss point at an earlier stage.

Table 4.4.7: Comparative profitability of maize processing and production unit

Particular	Processing unit (n=15)	Production unit* (n=20)	Difference	Times
Cost (Rs/unit)	9617.41	1196.99	8420.42	8.03
Net return (Rs/unit)	13991.66	239.04	13752.55	58.53
Rate (Rs/q)	6880.30	1317.00	5563.3	5.22
BEP at Price (Rs/q)	11957.84	1196.99	-	-
BEP at Yield (Rs/unit)	3450.2	309.8		
BC ratio	2.32	1.14	-	-

*Production unit considered the cost of cultivation of all the three seasons i.e. rabi, kharif and summer maize

4.4.8 Comparative profitability of processing unit and production unit for wheat

The cost incurred in processing unit (Rs 5130.34/q) was much higher than production unit (Rs 1061.35/q) due to high investment in machineries, utilities (power etc.), expenses (GST, storage, transportation etc.), labour charge etc. Although investment was more for processing unit, but net return was also higher in case of processing (Rs 3850.77/q) unit compared to production unit (Rs 848.22/q) revealed from Table 4.4.8. Thus, processing helps in realizing more income, increasing shelf life of product, reducing wastage etc. The rate of processed product (Rs 8606.67/q) was more than wheat (Rs 1767.50/q); thus income earned was more for processing unit. The break-even point at yield was achieved earlier than actual price for both the enterprises (production unit-61.12% %; processing unit- 1.97%), indicated economic feasibility of units. The benefit cost ratio was higher for production unit (1.8) compared to processing unit (1.32) due to more investment in processing unit.

Table 4.4.8: Comparative profitability of processing and production unit for wheat

Particular	Processing unit (n=15)	Production unit (n=20)	Difference	Times
Production cost (Rs/unit)	5130.34	1061.35	4068.99	4.83
Net return	3850.77	848.22	3002.55	4.53
Rate	8606.67	1767.50	6839.17	4.86

(Rs/q)				
BEP at Yield (Q/unit)	8766.11	30.06		
BEP at Price (Rs/q)	6676.74 (77.57%)	1061.35 (60.04%)		
BC ratio	1.32	1.8		

4.4.9 Comparative profitability of soybean processing and production unit

In case of processing unit, cost incurred was much higher than production unit around 1.35 times due to high initial investment as well as high recurring cost. However, net income realized by processing unit (Rs 2236.39/q) was more than production unit (Rs 766.39/q) from Table 4.4.9. Moreover, the rate of processed products (Rs 9243.33/q) was more than raw soybean (Rs 3145/q). However, the break even at yield was achieved much earlier than actual yields. Thus, both the units were economically viable. The benefit cost ratio was higher for processing unit (1.58) than production unit (1.34) due to more benefit in processing enterprise.

Table 4.4.9: Comparative profitability of soybean processing and production unit

Particular	Processing unit (n=15)	Production unit (n=20)	Difference	Times
Cost (Rs/q)	3313.98	2447.53	866.44	1.35
Net return (Rs/q)	2236.39	766.39	1470.00	2.91
Rate (Rs/q)	9243.33	3145.00	6098.33	2.93
BEP at Yield (Q/unit)	3731.71	17.22		
BEP at Price (Rs/q)	3731.71 (40.37%)	2447.53 (77.82%)		
BC ratio	1.58	1.34		

4.4.10 Comparative profitability among fruit producers

Hypothesis 1

Ho: There was no significant difference among fruit producers for net return

H1: There was significant difference among fruit producers for net return

Table 4.4.10: Comparative profitability among fruit producers by one way ANOVA test

Particular	Farmers (n=20)	Mean	S.D.	Mean square (df)	F
Cost (Rs/ha)	*Aonla*	117826.14	4799.82	3.404E+9 (2) 3.029E+7(57)	112.36 (p<0.001)
	Guava	127402.52	4735.23		
	Mango	143634.24	6739.79		
Net return (Rs/ha)	*Aonla*	446773.85	53862.26	1.804E+12(2) 4.136E+9(57)	436.29 (p<0.001)
	Guava	743437.47	92323.08		
	Mango	142665.75	31381.46		
Yield (Rs/ha)	*Aonla*	470.50	44.06	1017417.91 (2) 1489.24(57)	683.17 (P<0.001)
	Guava	512.00	48.97		
	Mango	102.25	11.29		
BEP at yield	*Aonla*	98.18	3.99	19699.18(2) 7.95(57)	2477.69 (p<0.001)
	Guava	38.60	1.43		
	Mango	51.29	2.40		
BC ratio	*Aonla*	4.80	.51	118.90 (2) .33 (57)	352.51 (p<0.001)
	Guava	6.85	.83		
	Mango	1.99	.22		

The profitability among fruit growers (*aonla*, guava and mango) per hectare was analysed through one way ANOVA test and it was found that there was significant difference (F=112.36, p<0.001) among fruit growers for cost incurred in orchard (Table 4.4.10). It was observed that cost incurred for mango orchard (Rs 143634.24/ha) was higher due to more number of irrigation, pesticides spray, weeding, etc. followed by guava orchard (Rs 127402.52/ha) and *aonla* orchard (Rs 117826.14/ha). The net return from guava orchard (Rs 743437.47/ha) was more due to twice fruiting per year, followed by *aonla* orchard (Rs 446773.85/ha) and mango orchard (Rs 142665.75/ha). The net return of *aonla* orchard was more than mango due to more production of *aonla* (470.50q/ha) than mango (102.25q/ha). The significant difference was obtained among fruit growers for net return at test statistic (F=436.29, p<0.001); thus null hypothesis was rejected and alternate hypothesis was accepted. All three enterprises were found to be economically viable as break-even point (BEP) at yield was achieved earlier than actual yield. The benefit cost ratio was higher for guava orchard (6.8), followed by *aonla* (4.8) and mango (1.9) orchard. The probable reason for high BC ratio of guava may be more benefit to guava orchard due to twice fruiting and low BC ratio of mango due to comparatively high cost incurred in it.

4.4.11 Comparative profitability among fruit processors

Hypothesis 2:

Ho: There was no significant difference among fruit processors for net return

H1: There was significant difference among fruit processors for net return

Table 4.4.11: Comparative profitability among fruit processors by one way ANOVA test

Particulars	Processors (n=15)	Mean	S.D.	Mean square (df)	F
Cost (Rs/q)	*Aonla*	7864.71	462.87	4.986E+12(2) 9.340E+12(42)	.534 (p=0.59)
	Guava	10467.11	4057.94		
	Mango	6308.99	1988.76		
Net Return (Rs/q)	*Aonla*	6801.95	479.48	2.114E+13(2) 1.154E+13(42)	1.83 (p=.73)
	Guava	5732.88	2000.31		
	Mango	6557.67	2385.33		
Production (q/y)	*Aonla*	271.33	221.45	5362.22 (2) 49120.0(42)	.109 (p=0.89)
	Guava	265.33	222.12		
	Mango	300.67	221.31		
Rate (Rs/q)	*Aonla*	146.67	7.94	2562.22(2) 1673.41(42)	1.531 (p=0.22)
	Guava	162.00	51.57		
	Mango	136.00	47.92		
BEP at yield (Q/unit)	*Aonla*	173.05	135.69	10431.478(2) 3244.18(42)	.311 (p=0.73)
	Guava	207.97	182.60		
	Mango	224.74	220.85		
BC ratio	*Aonla*	1.86	.06	1.005(2) 0.066(42)	15.153 (P<0.01)
	Guava	1.60	.24		
	Mango	2.12	.36		

There was significant difference among fruit processors (*aonla*= Rs 7864/q, guava= Rs10467/q and mango= Rs 6308/q) was observed for cost incurred in processing unit (Table 4.4.11). However, no significant difference at test statistic (F=1.42; p=.252) was found for net return, thus null hypothesis accepted. Again no significant difference was seen for yield of processing unit in the range of 265q to 300q and rate of processed products within range of Rs 136/Kg to Rs 162/Kg. In all cases, break-even point at yield was obtained earlier, thus units were economically viable. The benefit cost ratio was higher in mango (2.12) followed by *aonla* (1.86) and guava (1.6).

4.4.12 Comparative profitability among vegetable producers

Hypothesis 3

Ho: There was no significant difference among vegetable producers for net return

H1: There was significant difference among vegetable producers for net return

Table 4.4.12: Comparative profitability among vegetable producers by one way ANOVA test

Particular	Farmers (n=20)	Mean	S.D.	Mean square (df)	F
Cost (Rs/q)	Tomato	262.03	87.92	147682291.21(2) 20032.83(57)	7372.01 (p<0.001)
	Potato	481.99	55.93		
	Mushroom	5074.78	221.90		
Net return (Rs/q)	Tomato	537.96	87.92	12716433.440 20209.019	629.24 (p<0.001)
	Potato	-166.04	60.47		
	Mushroom	1425.21	221.90		
Yield (Rs/q)	Tomato	727.62	659.42	2151248.25(2) 156891.43(57)	13.71 (p<0.01)
	Potato	220.10	180.74		
	Mushroom	114.0	56.23		
BEP at yield (Q/unit)	Tomato	209.25	155.56	156019.65(2) 20928.98(57)	7.45 (P<0.01)
	Potato	259.20	192.22		
	Mushroom	87.49	40.45		
BC ratio	Tomato	3.40	1.17	41.34(2) .46(57)	88.97 (p<0.01)
	Potato	.66	.094		
	Mushroom	1.28	.054		

The significant difference was observed among vegetable growers (tomato, potato and mushroom) for cost incurred at test statistic (F=7372.01; p<0.001) as indicated in Table 4.4.12. It was found that cost incurred in mushroom farming (Rs 5074.78/q) was more followed by potato (Rs 481.99/q) and tomato (Rs 262.03/q) farming. The reason may be high investment in mushroom building, equipment and its maintenance in mushroom farming. The significant difference among vegetable growers was found for net return at test statistic (F=629.24; p<0.001), thus, null hypothesis was rejected. The net return was found more in case of mushroom (Rs 1425.21/q), followed by tomato (Rs 537.9/q) and potato (Rs -166.07/q) farming as price of mushroom was higher compared to tomato and potato. The tomato cultivation was done under net-house so, yield (727.62q/y) was more followed by potato (220q/y) and mushroom (114q/y) farming. In case of potato farming, net return was in loss due to low price (Rs 4/kg) of potato in market. The break-even

point at yield was lower than actual yield for tomato (28.75 %) and mushroom (76.74 %) farming, thus both the units were viable. However, the break-even yield (259.20q/unit) for potato was higher than actual yield (220q/farm). Further, break-even point at price was also calculated and found to be Rs 7.10/Kg but presently, farmers were receiving Rs 4/ kg. Hence, it is suggested that selling price of potato should be fixed by government to save the farmers for paying from their pocket in order to feed others. The study also suggested focusing on new technology for increasing productivity of potato and disseminating this technology to farmers at earliest. Otherwise days are not far that they will leave potato farming. The benefit cost ratio was more for tomato farming (3.4) followed by mushroom (1.23) and potato (.66) farming.

4.4.13 Comparative profitability among vegetable processors

Hypothesis 4

Ho: There was no significant difference among vegetable processors for net return

H1: There was significant difference among vegetable processors for net return

There was no significant difference in the cost of processing of vegetable processors i.e. (mushroom (Rs 7201.53/q), potato (Rs 6334.12/q) and tomato (Rs 6165.97/q)). However, the significant difference for net return among vegetable processors was found at test statistic ($F=9.29$, $p<0.001$), thus null hypothesis rejected. The net return was more in potato processing (Rs 5710.3/q) followed by tomato (Rs 4422.91/q) and mushroom (Rs 2098.72/q) processing. The production was higher in mushroom (3668q/y) followed by potato (580.48 q/y) and tomato (300q/y) processing unit. Further, rate of processed product was observed higher in potato (Rs 119.33/Kg) followed by tomato (Rs 113/Kg) and mushroom (Rs 92.46/Kg).In all the cases, break even at yield was obtained lower than actual yield, thus, vegetable processing enterprises were economically viable. The benefit cost ratio was higher in potato (2.65) followed by tomato (1.74) and mushroom (1.39). The BC ratio was lowest in mushroom due to comparatively high cost incurred in mushroom enterprise and potato obtained highest BC ratio due to due to more total benefit than tomato processing.

Table 4.4.13: Comparative profitability among vegetable processors by one way ANOVA test

Particulars	Processor (n=15)	Mean	S.D.	Mean square (df)	F
Cost (Rs/q)	Tomato	6165.97	970.57	4632619.3 (2) 54220961.866(42)	.085 (p<0.918)
	Potato	6334.12	11640.28		
	Mushroom	7201.53	5121.00		
Net Return (Rs/q)	Tomato	4422.91	1488.62	50256870.9(2) 5451266.622 (42)	9.219 (p<0.001)
	Potato	5710.30	3520.49		
	Mushroom	2098.72	1320.58		
Production (Q/y)	Tomato	300.0	148.84	52387135.16 (2) 2157880.59 (42)	24.277 (p<0.001)
	Potato	580.48	664.93		
	Mushroom	3668.00	2451.39		
Rate (Rs/q)	Tomato	113.33	39.35	2984.6(2) 588.75(42)	5.06 (p<0.011)
	Potato	119.33	14.49		
	Mushroom	92.46	2.68		
BEP at yield (Q/unit)	Tomato	215.37	132.41	36902203.62 (2) 1658631.32 (42)	22.249 (p<0.001)
	Potato	338.91	596.81		
	Mushroom	2991.73	2145.26		
BC ratio	Tomato	1.74	.295	6.366(2) .646(42)	9.858 (p<0.001)
	Potato	2.65	1.277		
	Mushroom	1.39	.465		

4.4.14 Comparative profitability among food grain producers

Hypothesis 5

Ho: There was no significant difference among food grain growers for net return

H1: There was significant difference among food grain growers for net return

The significant difference was obtained among food grain farmers (*rabi* maize, wheat and soybean) for cost of cultivation at test statistic (F=167.47, p<0.001) as depicted in Table 4.4.14. The cost incurred in maize farming (Rs 43956.89/acre) was more than soybean (Rs 18857.62/ acre) and wheat farming (Rs 18070.15/acre). The reason may be high irrigation charge, labour charge especially during harvesting, manure cost etc. The cost of soybean farming was slightly higher than wheat due to more number of pesticides spray. The significant difference among food grain farmers was obtained for net return at test statistic (F= 9.752; p<0.001). Thus, null hypothesis was rejected and alternate hypothesis was accepted. It was observed that net return was more in wheat farming (Rs 14650.09/acre) followed by maize (Rs 8940.60/acre) and soybean (Rs 6438.62/acre). The net return

was high for maize due to low cost of cultivation, more production (17 q/acre) than soybean (7.9 q/acre) and better market price of wheat (Rs 1735/q) than maize (Rs 1200/q). The net return for soybean was lowest due to low productivity mainly because of weather uncertainty and more fluctuation in market price in the range of (Rs 2600/q to Rs 4000/q). The break-even point at price and yield in case of maize was just obtained near to actual. In case of wheat, the break-even point at price (61.11%) and yield (59.59%) was obtained earlier than actual price and yield, thus, economically viable. The soybean farming was also found as economically viable at break-even achieved at 87.41 per cent of price and 76.32 per cent of yield. The benefit cost ratio (BC ratio) was more in wheat (1.81) followed by soybean (1.34) and maize (1.24). The cost of cultivation was low in wheat, thus obtained high BC ratio. The cultivation cost of maize was high so obtained lowest BC ratio.

Table 4.4.14: Comparative profitability among food grain producers by one way ANOVA test

Particulars	Farmers (n=20)	Mean	S.D.	Mean square (df)	F
Cost (Rs/acre)	Rabi Maize	43956.89	8698.70	4.335E+8(2) 2.573E+7(57)	168.473 (p<0.001)
	Wheat	18070.15	989.68		
	Soybean	18857.62	747.94		
Net Return (Rs/acre)	Rabi Maize	8940.60	9288.66	3.542E+8(2) 3.632E+7(57)	9.752 (p<0.001)
	Wheat	14650.09	2751.37		
	Soybean	6438.62	3891.02		
Yield (q/acre)	Rabi Maize	36.85	2.60	4372.517(2) 3.656(57)	1195.938 (p<0.001)
	Wheat	17.15	1.59		
	Soybean	7.90	1.28		
BEP at Price (Rs/Q)	Rabi Maize	1196.99	242.65	11679133.6 (2) 79586.63 (57)	146.747 (p<0.001)
	Wheat	1061.35	102.43		
	Soybean	2447.53	411.56		
BEP at yield (Q/unit)	Rabi Maize	36.63	7.24	5503.033(2) 17.743(57)	310.160 (p<0.001)
	Wheat	10.22	.60		
	Soybean	6.03	.56		
BC ratio	Rabi Maize	1.24	.22	1.87(2) .041(57)	45.90 (p<0.001)
	Wheat	1.81	.17		
	Soybean	1.34	.20		

4.4.15 Comparative profitability among food grain processors

Hypothesis 6

Ho: There was no significant difference among food grain processors for net return

H1: There was significant difference among food grain processors for net return

There was no significant difference obtained for cost of processing among food grain processors at test statistics (F=.784, p<0.463), thus, null hypothesis was accepted as depicted from Table 4.4.15. Similarly for net return, there was no significant difference among processors, thus null hypothesis was accepted. The rate of processed product was higher for soybean (Rs 9243.33/q) followed by wheat (Rs 8606.67/q) and maize (Rs. 6880/q). All the units were economically viable as per break-even point at yield. The benefit cost ratio obtained was more for maize unit (2.38) followed by soybean and wheat units due to low cost of processing in maize followed by soybean (1.58) and wheat (1.32).

Table 4.4.15: Comparative profitability among food grain processors by one way ANOVA test

Particular	Processor (n=20)	Mean	S.D.	Mean square (df)	F
Cost (Rs/q)	Maize	9617.41	24434.43	157915764.031(2) 201189230.153(42)	.785 (p<0.463)
	Wheat	5130.34	2200.73		
	Soybean	3313.98	1297.32		
Net Return (Rs/q)	Maize	13991.66	44040.61	609075540.288 (2) 656867303.005(42)	.927 (p<0.404)
	Wheat	3850.77	4797.89		
	Soybean	2236.39	2829.51		
Yield (q/y)	Maize	3722.68	6793.20	1.953E+12 (2) 1.541E+12 (42)	1.268 (p=.292)
	Wheat	443800.00	526451.80		
	Soybean	719063.46	2084460.82		
Rate (Rs/Q)	Maize	6880.00	6357.021	22430166.67(2) 38904230.1 (42)	.577 (p=.566)
	Wheat	8606.67	7244.847		
	Soybean	9243.33	4879.874		
BEP at yield (Q/unit)	Maize	3450.26	5810.98	1.483E+12 (2) 1.545E+11 (42)	9.59 (p<0.001)
	Wheat	572797.05	678235.21		
	Soybean	56846.14	58804.71		
BC ratio	Maize	2.38	1.35	4.614(2) .688(42)	6.705 (p<0.01)
	Wheat	1.32	.21		
	Soybean	1.58	.42		

4.4.16 Increase in value addition at Net Income and Gross Income over raw material

Table 4.4.16: Representing increase in value addition at Net Income and Gross Income over raw material

Commo-dities	Average cost of raw material	Increase in value addition at NI	% increase in value addition at NI	Increase in value addition at GI	% increase in value addition at GI
Aonla	2,94,000	15,94,990.93	542.51	3,696.00	1257.14
Guava	6,43,466.67	991060.90	154.01	4165200	647.30
Mango	3,50,466.67	1884278.93	537.64	3909533.33	1115.52
Tomato	225266667	10,90,954	484.29	2986400	1325.71
Potato	2179316.67	1132660.24	51.97	4806450	220.54
Mushroom	1,49,70,000	-72,71,879.06	-48.57	1,91,43,333	127.87
Maize	19,24,877.3	42,07,64	218.59	1,52,94,456	794.56
Wheat	224012666.7	185,95,178	8.3004	5767,71,333	257.47
Soybean	41,68,10,933.3	-2687,79,395	-64.48	16,61,85,262	39.87

Table 4.4.16 indicates that percentage increased in value addition over raw material at net income was high for almost all agricultural commodities i.e. *aonla*, guava, mango, tomato, potato, maize, wheat due to more margin in profit. However, for mushroom and soybean, margin in profit was less, so, increased in value addition over raw material cost at net income was low but at gross income it was high.

4.5 Assessing the market channel and price spread of producers and processors

4.5.1 Assessing the market channel and price spread of *aonla* producers and processors

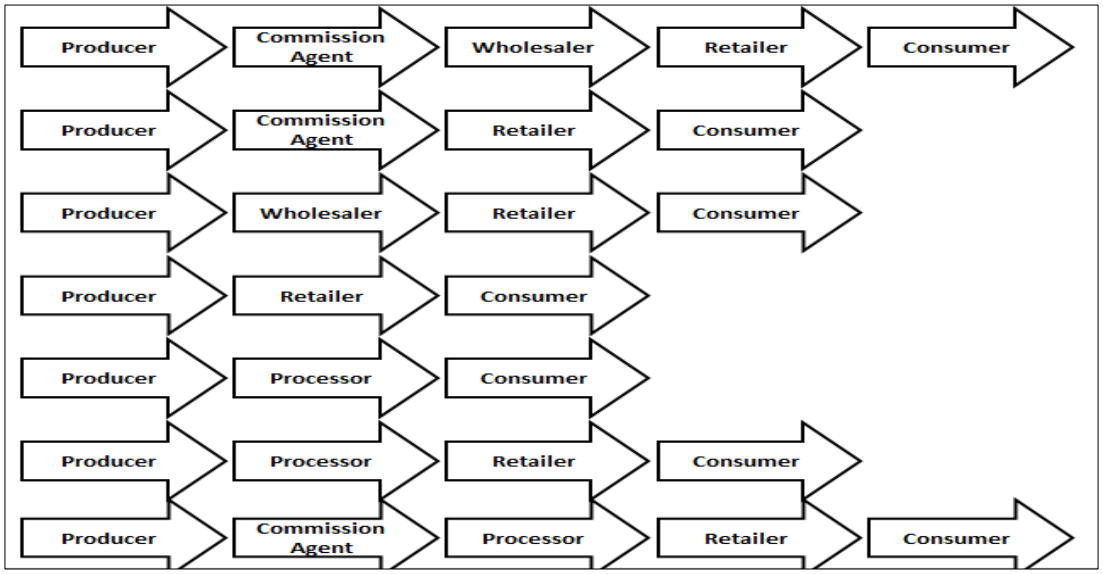

Figure 4.5.1: Marketing channel for *aonla* producer and processor

Table 4.5.1: Average Price spread of *aonla* producers and processors in different marketing channel

Actors	Particulars	Marketing Channel (Rs/Q)						
		I	II	III	IV	V	VI	VII
Producer	GPR	1200	1200	1100	1100	1000	1000	1200
	MC	194	194	32	32	0	0	194
	NPR	1006	1006	1068	1068	1000	1000	1006
Commission Agent	GPR	1350	1350	0	0	0	0	1350
	MC	84	84	0	0	0	0	84
	MM	66	66	0	0	0	0	66
Wholesaler	GPR	1650	0	1400	0	0	0	0
	MC	196	0	124	0	0	0	0
	MM	104	0	176	0	0	0	0
Processor	GPR	0	0	0	0	14700	14400	14400
	VAC	0	0	0	0	6660	6660	6660
	MC	0	0	0	0	115	115	167
	MM	0	0	0	0	6925	6625	6223
Retailer	GPR	2000	1800	1700	1650	0	14800	14800
	MC	233	213	151	161	0	42	42
	MM	117	237	149	389	0	358	358
Consumer	CP	2000	1800	1700	1650	14700	14800	14800
Producer/Processor share in Consumer Price		60	66.57	64.705	66.67	100	97.29	97.29
Market Efficiency (Shepherd's Formula)		1.82	2.66	4.54	7.55	126.83	93.27	29.39
Market Efficiency (Acharya's Formula)		1.01	1.26	1.68	1.83	1.1	1.09	1.09

***(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VAC- Value Addition Cost, CP- Consumer Price)**

Table 4.5.1 and figure 4.5.1 reveals that producers' share in consumers' price decreases as the number of middlemen increases, thus channel IV i.e. Producer-Retailer- Consumer (66.67) had high producers' share in consumers' price and channel I (60) had lowest share. Similarly, in case of processor, Channel V i.e. Producer-Processor-Consumer (100) was having highest share in consumers' price than Channel VI and VII (97.29). It can be inferred that compared to producers, processors were having more share in consumers' price. Similarly, marketing efficiency decreases as the number of middleman increases. Among producers, Channel IV (7.55) and among processors, Channel V (126.83) possessed highest marketing efficiency.

4.5.2 Marketing channel and price spread for guava producer and processor

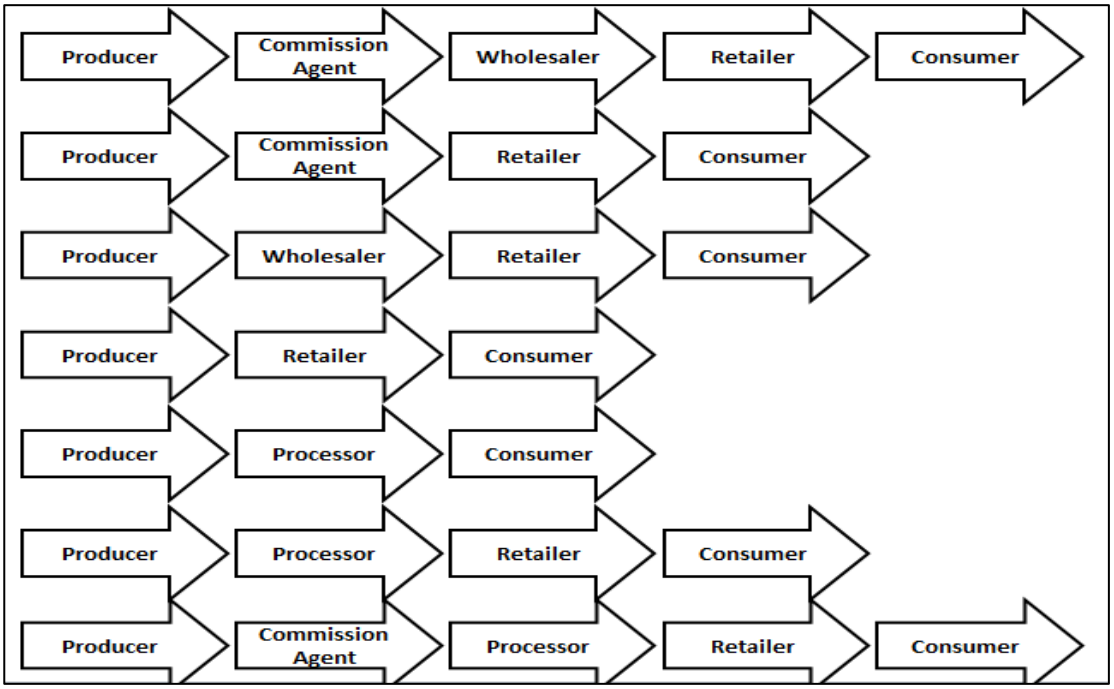

Figure 4.5.2: Marketing channel for guava producer and processor

Table 4.5.2: Average price spread and marketing channel for guava producer and processor

Actors	Particulars	Channels						
		I	II	III	IV	V	VI	VII
Producer	GPR	1800	1800	1600	1600	1500	1500	1800
	MC	250	250	32	32	0	0	250
	NPR	1550	1550	1568	1568	1500	1500	1550
Commission Agent	GPR	2020	2000	0	0	0	0	2020
	MC	118	118	0	0	0	0	118

	MM	102	82	0	0	0	0	102
Wholesaler	GPR	2350	0	1900	0	0	0	0
	MC	240	0	144	0	0	0	0
	MM	90	0	156	0	0	0	0
Processor	GPR	0	0	0	0	16200	16000	16000
	MC	0	0	0	0	120	120	203
	VAC	0	0	0	0	9537	9537	9537
	MR	0	0	0	0	5043	4843	4240
Retailer	GPR	2800	2400	2300	2100	0	16300	16400
	MC	259	249	141	171	0	155	155
	MM	191	151	259	329	0	145	245
Consumer	CP	2800	2400	2300	2100	16200	16300	16400
Producer/Processor share in Consumer Price		64.28	75	69.56	76.19	100	98.15	97.56
Market Efficiency (Shepherd's Formula)		2.23	2.89	6.25	9.345	134	58.27	21.59
Market Efficiency (Acharya's Formula)		1.24	1.82	2.14	2.94	2.13	2.09	2.08

(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VACValue Addition Cost, CP- Consumer Price)

From the table 4.5.2 it is clear that producers' share in consumer price (76.19) and marketing efficiency (9.34) were highest in channel IV i.e. Producer-Retailer- Consumer whereas processors' share in consumer price (100) and market efficiency (134) were highest in channel V i.e. Producer-Processor- Consumer. It can be inferred that direct selling increases the producers' or processors' share in consumer price as well as market efficiency.

4.5.3 Marketing channel and price spread for mango producer and processor

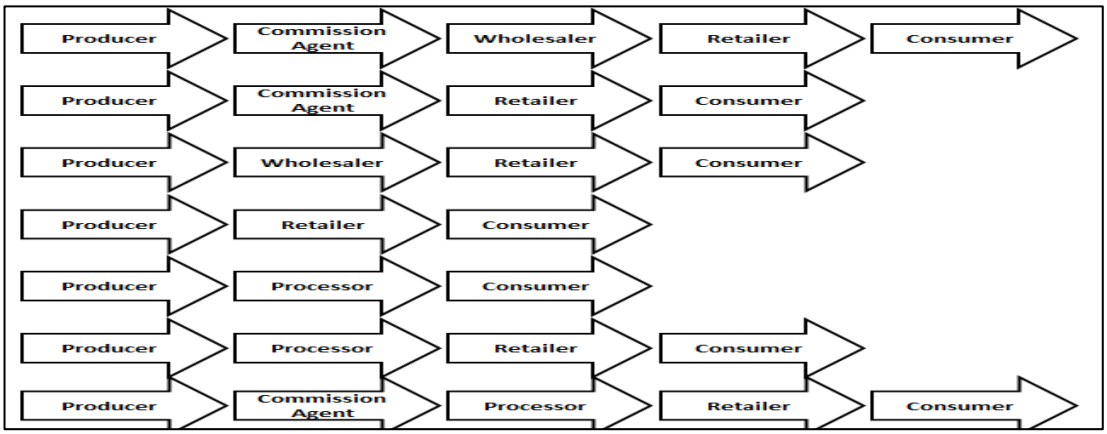

Figure 4.5.3: Marketing channel for mango producer and processor

Table 4.5.3: Marketing channel and price spread for mango producer and processor

Actors	Particulars	Channels						
		I	II	III	IV	V	VI	VII
Producer	GPR	2800	2800	2650	2700	1000	1000	1000
	MC	300	300	32	32	0	0	300
	NPR	2500	2500	2618	2668	1000	1000	700
Commission Agent	GPR	3150	3150	0	0	0	0	1400
	MC	178	178	0	0	0	0	178
	MM	172	172	0	0	0	0	222
Wholesaler	GPR	3580	0	2900	0	0	0	0
	MC	313	0	145	0	0	0	0
	MM	117	0	105	0	0	0	0
Processor	GPR	0	0	0	0	13600	13000	13000
	MC	0	0	0	0	145	145	303
	VAC	0	0	0	0	5585	5585	5585
	MM	0	0	0	0	6870	6270	5712
Retailer	GPR	4200	3700	3600	3500	0	14000	15000
	MC	329	319	171	131	0	151	161
	MM	291	231	529	669	0	849	1839
Consumer	CP	4200	3700	3600	3500	13600	14000	15000
Producer/Processor share in Consumer Price		66.67	75.68	73.61	77.15	100	92.85	86.67
Market Efficiency (Shepherd's Formula)		2.75	3.64	9.34	20.47	92.79	46.29	14.92
Market Efficiency (Acharya's Formula)		1.47	2.08	2.66	3.20	0.93	0.88	0.72

(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VAC- Value Addition Cost, CP- Consumer Price)

Table 4.5.3 depicted that as the middleman increases, the processors'/producers' share in consumers' price and marketing efficiency decreases. Thus, Channel I (Producer-Commission Agent-Wholesaler-Retailer-Consumer) was lowest in producers' share in consumers' price (59.52) and Channel VII i.e. Producer-Processor-Retailer-Consumer (86.67) had lowest processors' share in consumers' price. Similarly, the marketing efficiency was lowest in channel I (2.75) for producer and channel VII (14.92) for processor. It can be inferred that processors had more share in consumers' price and marketing efficiency (as per Shepherd's formula) after processing the raw material.

4.5.4 Marketing channel and price spread for tomato producer and processor

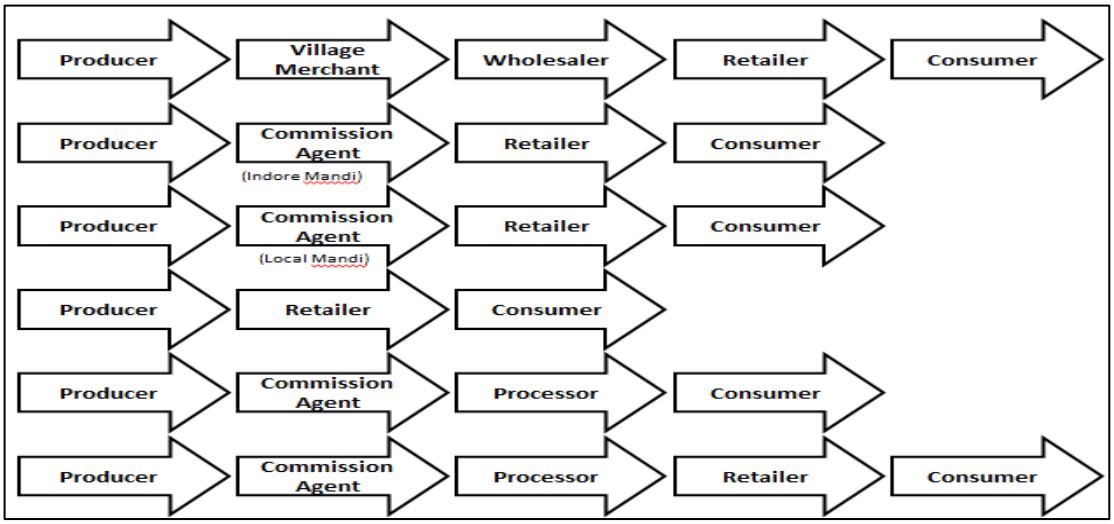

Figure 4.5.4: Marketing channel for tomato producer and processor

Table 4.5.4: Marketing channel and price spread for tomato producer and processor

Actors	Particulars	Marketing Channels (RS/Q)					
		I	II	III	IV	V	VI
Producer	GPR	800	800	800	800	800	800
	MC	10	135	19	5	135	135
	NPR	790	665	781	795	665	665
Commission Agent/Village Merchant	GPR	800	800	800	0	800	800
	MC	22.5	58	50	0	58	58
	MM	127.5	92	50	0	42	42
Wholesaler	GPR	950	0	0	0	0	0
	MC	89	0	0	0	0	0
	MM	61	0	0	0	0	0
Processor	GPR	0	0	0	0	11200	11300
	MC	0	0	0	0	152	152
	VAC	0	0	0	0	5568	5568
	MM	0	0	0	0	4580	4680
Retailer	GPR	1200	1000	900	800	0	12500
	MC	95	100	96	106	0	150
	MM	315	200	154	194	0	1050
Consumer	CP	1300	1200	1050	950	11200	12500
Producer/Processor share in Consumer Price		61.53	66.67	76.19	84.21	100	90.4
Market Efficiency (Shepherd's Formula)		4.54	2.41	4.45	6.2	31.46	24.25
Market Efficiency (Acharya's Formula)		1.54	1.24	2.90	5.12	1.25	0.99

(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VAC- Value Addition Cost, CP- Consumer Price)

Table 4.5.4 and figure 4.5.4 makes it clear that Channel IV (Producer-Retailer-Consumer) and Channel V (Producer-Commission agent-Processor-Consumer) had highest producers' (84.21) and processors' (100) share in consumers' price respectively, as well as marketing efficiency (F=6.2; P=31.46). For processor, marketing efficiency as well as share in consumers' price were higher compared to producers, thus, value addition increases the processors' share in consumers' price and marketing efficiency. For producers, marketing cost increased while selling their produce to Indore mandi, so they preferred to sell their produce in local mandi or to village merchant.

4.5.5 Marketing channel and price spread for potato producer and processor

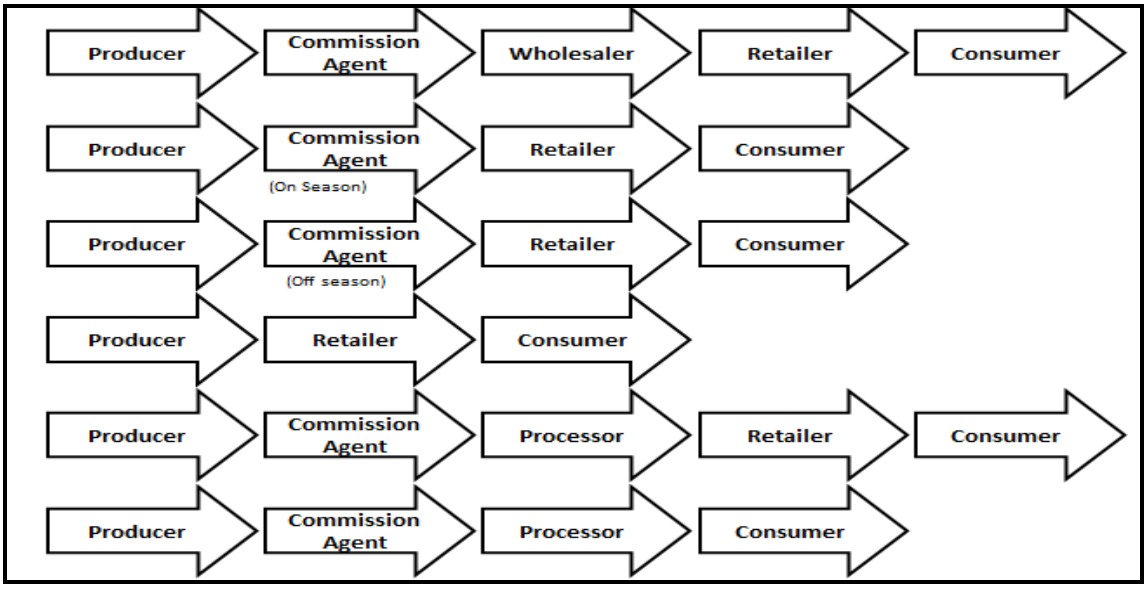

Figure 4.5.5: Marketing channel for potato producer and processor

Table 4.5.5: Marketing channel and price spread for potato producer and processor

Actors	Particulars	Marketing Channels (Rs/Q)					
		I	II	III	IV	V	VI
Producer	GPR	400	400	700	400	1200	1200
	MC	82	82	378	40	162	162
	NPR	318	318	322	360	1038	1038
Commission Agent	GPR	550	550	870	0	1500	1500
	MC	43	43	43	0	43	43
	MM	107	107	127	0	257	257
Wholesaler	GPR	790	0	0	0	0	0
	MC	76	0	0	0	0	0
	MM	164	0	0	0	0	0
Processor	GPR	0	0	0	0	11900	11900
	MC	0	0	0	0	140	140

	VAC	0	0	0	0	5075	5075
	MM	0	0	0	0	5185	5185
Retailer	GPR	1100	1000	1500	800	0	13000
	MC	86	76	77	112	0	95
	MR	224	374	553	388	0	1005
Consumer	CP	1100	1000	1500	800	11900	13000
Producer/Processor share in Consumer Price		36.36	40	46.67	50.00	100	91.56
Market Efficiency (Shepherd's Formula)		2.83	3.97	2.01	4.26	33.49	28.54
Market Efficiency (Acharya's Formula)		0.40	0.46	0.27	0.81	3.12	2.26

(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VAC- Value Addition Cost, CP- Consumer Price)

Table 4.5.5 and figure 4.5.5 depicted that channel IV (Producer-Retailer-Consumer) for potato producers and Channel V (Producer-Processor-Consumer) for potato processors were having highest consumers' share in price (F=50.00, P=100). The marketing efficiency of Channel IV for producers (4.26) and channel V for processor (33.49) was high because of reduction in number of middlemen. In case of producers, producers' share in consumer price (46.67) during off-season selling of potato was more compared to on-season selling due to increase in price of potato during off season whereas, market efficiency was higher for on-season compared to off season due to high marketing cost like storage, sorting and transportation cost during off season potato. For processor, channel V was having 100 percent shared in consumers' price and more market efficiency than channel VI.

4.5.6 Marketing channel and price spread for mushroom producer and processor

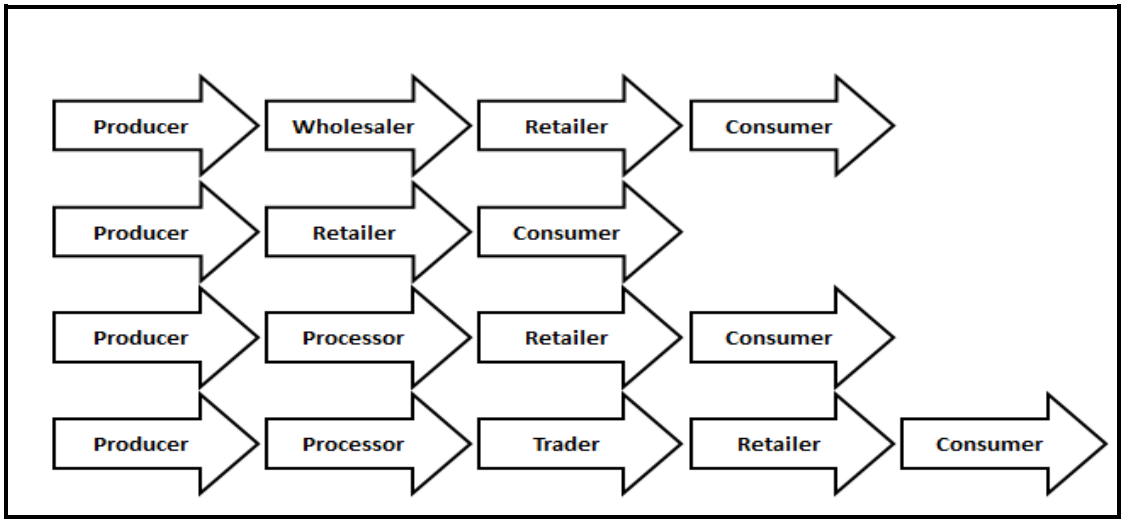

Figure 4.5.6: Marketing channel for mushroom producer and processor

Table 4.5.6: Marketing channel and price spread for mushroom producer and processor

Actors	Particulars	Channels			
		I	II	III	IV
Producer	GPR	6500	6400	5800	5800
	MC	105	20	0	0
	NPR	6395	6380	5800	5800
Wholesaler	GPR	7000	0	0	0
	MC	90	0	0	0
	MM	410	0	0	0
Processor	GPR	0	0	9285	9285
	MC	0	0	45	45
	VAC	0	0	3100	3100
	MM	0	0	340	340
Trader	GPR	0	0	0	9600
	MC	0	0	0	195
	MM	0	0	0	20
Retailer	GPR	7300	7000	9900	9950
	MC	125	180	210	210
	MM	175	420	405	190
Consumer	CP	7300	7000	9900	9950
Producer/Processor share in Consumer Price		89.04	91.42	93.78	93.31
Market Efficiency (Shepherd's Formula)		21.81	34	37.82	21.11
Market Efficiency (Acharya's Formula)		7.06	10.29	9.28	8.84

(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VAC- Value Addition Cost, CP- Consumer Price)

Table 4.5.6 and figure 4.5.6 indicated that Channel II (Producer-Retailer-consumer) for mushroom producers and Channel III (Producer-Processor-Retailer-Consumer) for mushroom processor were having highest share in consumers' price (F=91.42, P=93.78) as well as market efficiency (F=34, P=37.82). It can be inferred that processors were having high share in consumers' price and market efficiency (according to Shepherd's formula) than producers.

4.5.7 Marketing channel and price spread for maize producer and processor

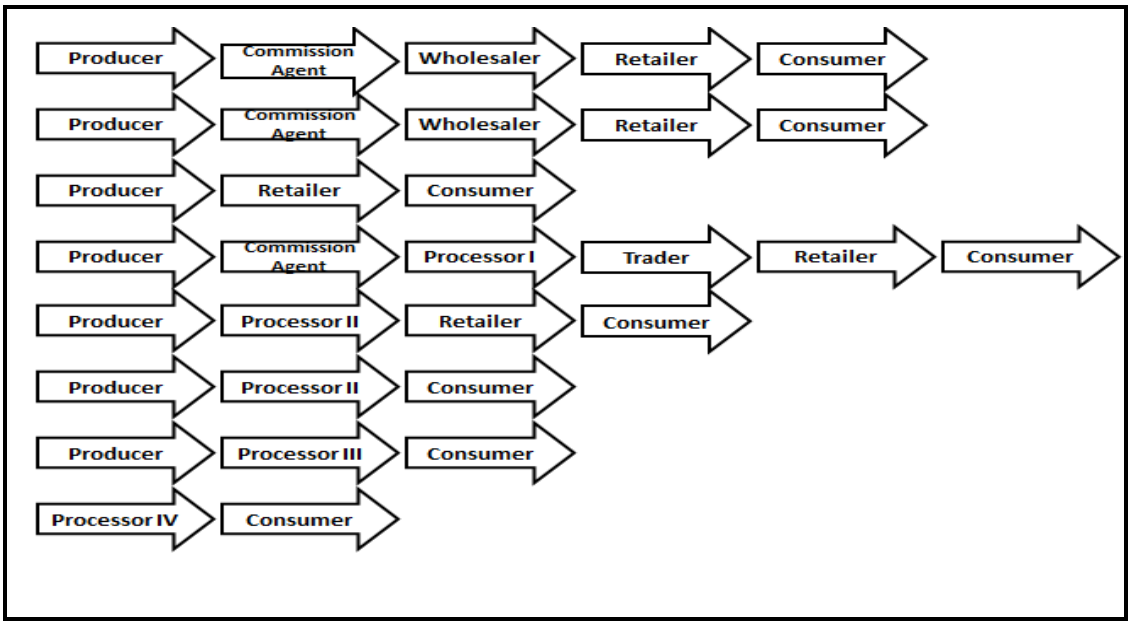

Figure 4.5.7: Marketing channel for maize producer and processor

(Processor I- Poultry Feed, Processor II- Maize Namkeen, Processor III- Maize Flour, Processor IV- Seed Production)

Table 4.5.7: Marketing channel and price spread for maize producer and processor

Actors	Particula-rs	Channels							
		I	II	III	IV	V	VI	VII	VIII
Producer	GPR	1200	1400	1100	1200	1100	1100	0	0
	MC	116	186	0	116	0	0	0	0
	NPR	1084	1214	1100	1084	1100	1100	0	0
Commission Agent	GPR	1350	1550	0	1300	0	0	0	0
	MC	65	65	0	65	0	0	0	0
	MR	85	85	0	35	0	0	0	0
Processor	GPR	0	0	0	4200	8000	7000	500	14330
	MC	0	0	0	50	66	66	0	35
	VAC	0	0	0	2230	4300	4300	200	6270
	MR	0	0	0	617	2534	1534	300	8025
Wholesaler/ Trader	GPR	1600	1800	0	4600	0	0	0	0
	MC	125	130	0	50	0	0	0	0
	MM	125	120	0	350	0	0	0	0
Retailer	GPR	1900	2150	1600	5000	0	8100	0	0
	MC	135	135	75	90	0	77	0	0
	MR	165	215	425	310	0	1023	0	0
Consumer	CP	1900	2150	1600	5000	8000	8100	500	14330
Producer/Processor share in Consumer Price		63.15	65.11	68.75	84	100	86.41	100	100
Market Efficiency		3.30	3.16	20.33	12.47	120.21	55.64	499	408.4

(Shepherd's Formula)								
Market Efficiency (Acharya's Formula)	1.32	1.29	2.2	1.97	2.07	2	0.66	0.77

(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VAC- Value Addition Cost, CP- Consumer Price)

Table 4.5.7 and figure 4.5.7 indicated that among maize producers, Channel III (Producer-Retailer-Consumer) had highest producers' share in consumers' price (68.75) and marketing efficiency (20.33) due to less number of intermediaries in this channel. There were four types of maize processors like poultry feed maker (Processor I), *namkeen* maker (Processor II), flour maker (Processor III) and seed production (Processor IV). Among these processors, Channel V, VII and VIII were having 100 % in processors' share in consumer price. The poultry feed processor was found to have only one channel IV (Producer-commission agent-processor-trader-retailer-consumer) with market efficiency of 12.47. *Namkeen* making processors were having two channels V and VI but channel V was having slightly higher market efficiency (120.21) due to direct selling. The marketing efficiency of Channel VII (*flour* making) and channel VIII (seed production) were 499 and 408.4 respectively. It was observed that with decrease in intermediaries the efficiency of marketing channel increases.

4.5.8 Marketing channel and price spread for wheat producer and processor

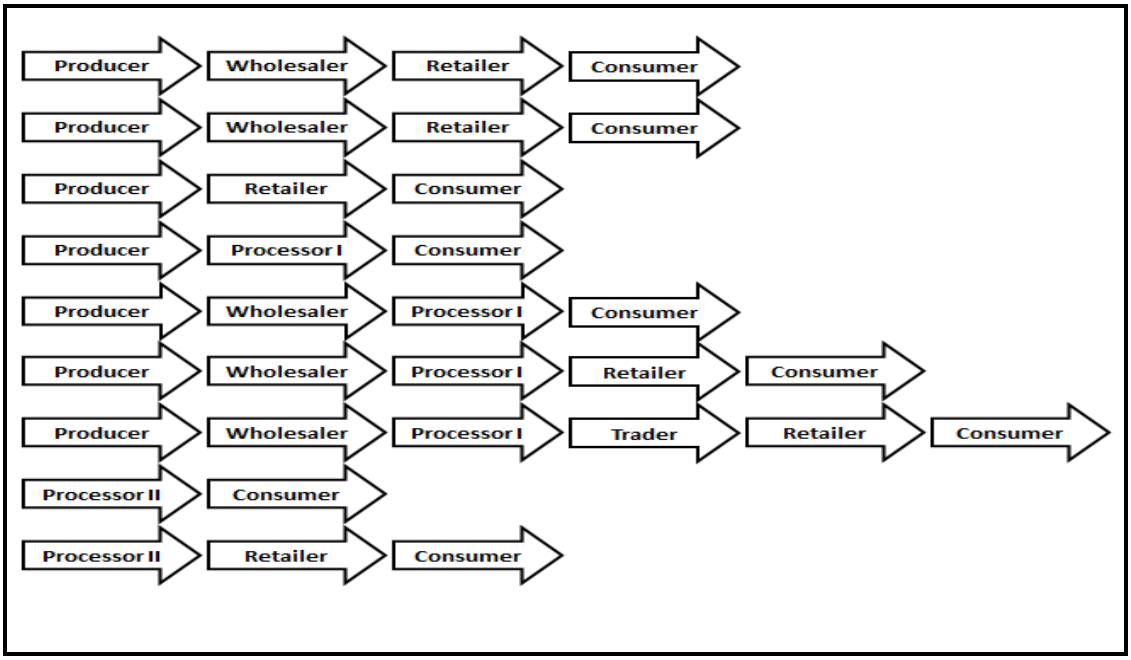

Figure 4.5.8: Marketing channel for wheat producer and processor

(Processor I – Semolina, Dalia, Cattle feed etc.

Processor II- Bakery Products i.e. Bread, Brown Bread, Buns, Rusk, Biscuit, Pizza Base etc.)

Table 4.5.8: Marketing channel and price spread for wheat producer and processor

Actors	Particul-ars	Marketing Channels (RS/Q)								
		I	II	III	IV	V	VI	VII	VIII	IX
Producer	GPR	1750	1900	1750	1750	1750	1750	1750	0	0
	MC	52	137	0	0	52	52	52	0	0
	NPR	1698	1763	1750	1750	1698	1698	1698	0	0
Wholesaler	GPR	1880	2050	0	0	1900	1900	1900	0	0
	MC	65	65	0	0	65	65	65	0	0
	MR	65	85	0	0	85	85	85	0	0
Processor	GPR	0	0	0	7500	7700	7600	7600	15700	15500
	MC	0	0	0	85	30	30	30	50	40
	VAC	0	0	0	2428	2428	2428	2428	9500	9500
	MM	0	0	0	3237	3342	3242	3242	4150	3960
Trader	GPR	0	0	0	0	0	0	7850	0	0
	MC	0	0	0	0	0	0	75	0	0
	VAC	0	0	0	0	0	0	175	0	0
Retailer	GPR	2100	2250	2000	0	0	8000	8200	0	16000
	MC	77	77	87	0	0	82	82	0	87
	MM	143	123	163	0	0	318	268	0	413
Consumer	CP	2100	2250	2000	7500	7700	8000	8200	15700	16000
Producer/Processor share in Consumer Price		83.33	84.44	87.5	100	100	95	92.68	100	96.875
Market Efficiency (Shepherd's Formula)		9.82	7.06	21.98	87.23	51.38	33.93	25.97	313	124.98
Market Efficiency (Acharya's Formula)		4.22	3.62	7	1.25	1.15	1.06	1.01	2.73	2.55

(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VAC- Value Addition Cost, CP- Consumer Price)

From table 4.5.8 and figure 4.5.8 it is depicted that among producers, channel III (Producer-Retailer-Consumer) had highest producers' share in consumers' price (87.5) and market efficiency (21.98) due to direct selling of wheat. Among processors, there were two types of processors, *i.e.*, Processor I (semolina, dalia, cattle feed etc.) and Processor II (Bakery products). Among Processor I, channel IV

and V were having highest processors' share in consumers' price (100) and market efficiency (87.23 & 51.38 respectively). Among Processor II, channel VII has highest share in consumers' price (100) and market efficiency (124.98).

4.5.9 Marketing channel and price spread for Soybean producer and processor

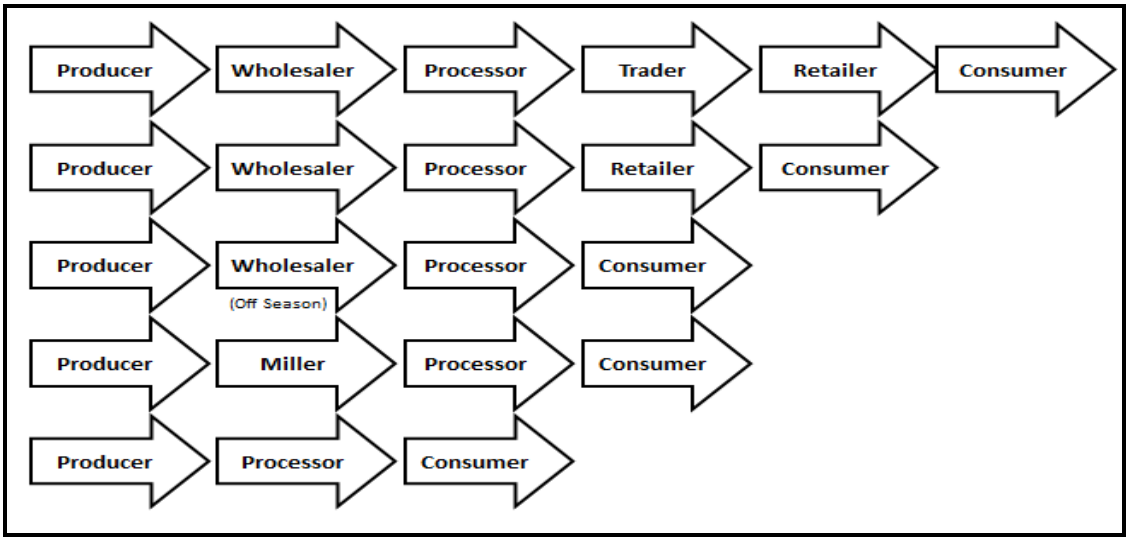

Figure 4.5.9: Marketing channel for soybean producer and processor

Table 4.5.9: Marketing channel and price spread for soybean producer and processor

Actors	Particulars	Marketing Channels (Rs/Q)				
		I	II	III	IV	V
Producer	GPR	2700	2700	3200	2700	2700
	MC	77	77	162	77	0
	NPR	2623	2623	3038	2623	2700
Wholesaler/ Miller	GPR	3000	3000	3500	2900	0
	MC	115	115	140	125	0
	MR	185	185	160	75	0
Processor	GPR	7600	7600	7600	7200	7000
	MC	65	65	80	65	60
	VAC	810	810	810	810	810
	MR	3725	3725	3210	3425	3430
Trader	GPR	7850	0	0	0	0
	MC	125	0	0	0	0
	MR	125	0	0	0	0
Retailer	GPR	8200	8000	0	0	0
	MC	130	130	0	0	0
	MR	220	270	0	0	0
Consumer	CP	8200	8000	7600	7200	7000

Producer share in Consumer Price	32.92	33.75	42.10	37.5	38.57
Processor share in Consumer Price	92.68	95	100	100	100
Market Efficiency (Shepherd's Formula)	15.01	19.67	18.89	25.96	115.67
Market Efficiency (Acharya's Formula)	0.72	0.75	1.02	0.91	1.00

(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VAC- Value Addition Cost, CP- Consumer Price)

From Table 4.5.9 and Figure 4.5.9 it is clear that among soybean producers, producers' share in consumers' price and market efficiency (Acharya's formula) were highest in channel III (Producer-Wholesaler/Miller-Processor-Consumer) during off season. In case of processor, channel III, IV and V obtained more share in consumers' price (100) and market efficiency (18.89, 25.96 and 115.67) due to direct selling of processed product.

4. 6 Developing value chain maps for selected agricultural commodities

For developing the value chain three major dimensions were considered i.e., activities, actors and entrepreneurial environment (AAE). The prime focus for developing value chain of any agricultural commodity is to identify the activities in order to add value to the commodity such as, production of agricultural commodity, grading, storage, sorting, distribution, processing, retailing and at last consumption. The next step is to identify the major actors involved in value chain like producers, intermediaries, processors, retailers and consumers. After identifying major actors, the next step is to find out the viable marketing channels through market efficiency (Acharya and Shephards' Formula) and producers'/processors' share in consumers' price. The final step is to identify the existing entrepreneurial environment or support according to its reachability and importance in promoting value chain through venn diagram.

4.6.1 Developing value chain map of *Aonla* at Pratapgarh, UP

Figure 4.6.1 shows that the major activities for value chain were identified as production of *aonla* by producers, distribution of *aonla* through intermediaries or directly to processor, processing into various products i.e. *amla candy, juice, laddu, burfi, churan* etc., retailing the processed products and finally consumption. For

producers the channel IV was found to be the most efficient due to highest market efficiency (7.55) and producers' share in consumers' price (66.67) because of less number of intermediaries retrieved from table no 4.5.1. Among processors, channel V was most efficient due to highest market efficiency (126.55) and more processors' share in consumers' price (100).

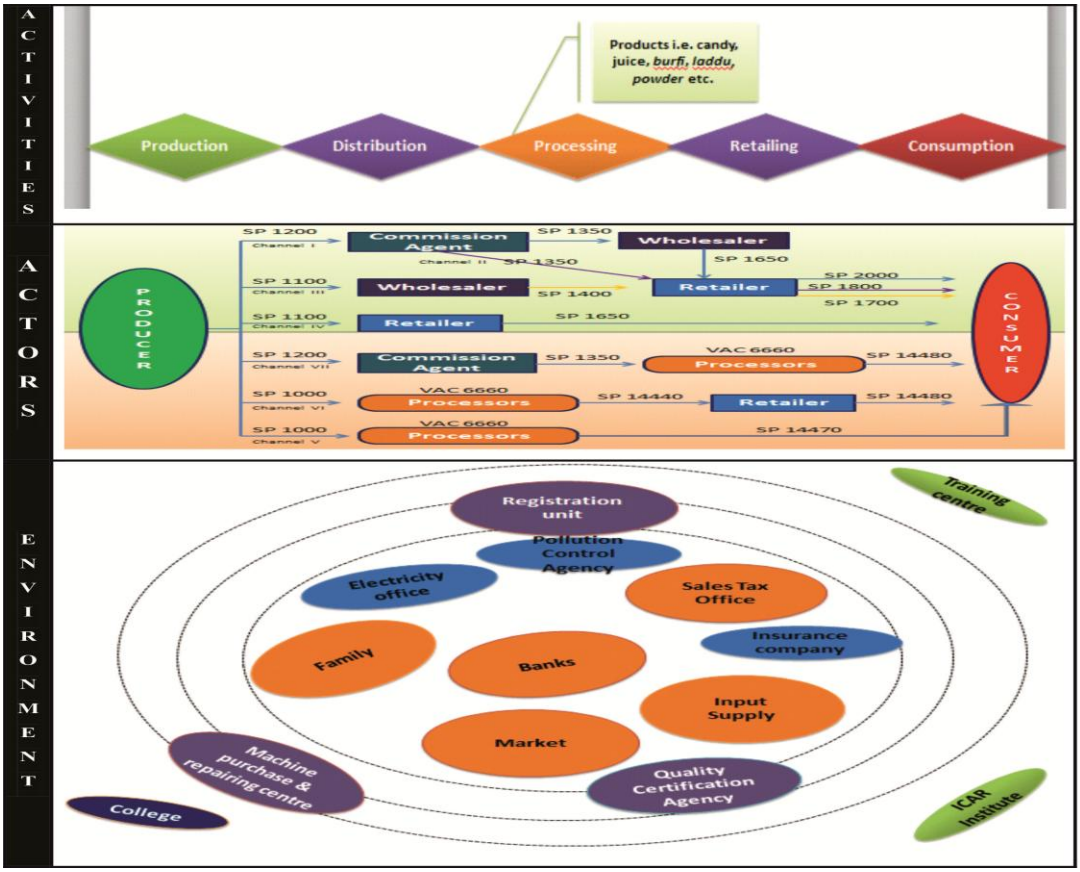

Figure 4.6.1: Representing value chain map of Aonla at Pratapgarh, UP

The entrepreneurial environment has been represented through venn diagram, so inner orbit indicated within 10 km of reach from processing unit, middle orbit indicated 20 km and outer circle indicated 30 km and beyond that more than 30 km. The size of circle represents the importance, smaller circle shows less important, middle circle shows moderately important and large circle indicates highly important. Thus, the entrepreneurial environment for *aonla* processors indicated that registration, machine maintenance centre and quality certification agency were falling in middle orbit means within 20 km of reachability however, ICAR institutional support, training institutes and college related to entrepreneurship and food processing were beyond 30 km. The other supporting environment like input supply, market, sale tax office, family, bank, etc. were within the reach of 10 km.

Based on importance of entrepreneurial environment, most important factors were input supply, market, bank, family support, registration and quality certification agency, however, moderately important institutions were electricity office and insurance company. ICAR institutions, college related to entrepreneurship and/or food processing and training centres were found least important factors for promoting entrepreneurial environment as most of the processors were getting less assistance from these institutions due to its location at far distance.

4.6.2 Developing value chain map of Guava at Allahabad, UP

The major identified activities for guava processors were production of guava, distribution of guava through intermediaries, then processing it into products like jelly followed by retailing and consumption as indicated in fig 4.6.2. Then different marketing channel were identified and market efficiency was calculated. Thus, for producer, channel IV was most efficient because of more producers' share in consumers' price (76) and market efficiency (9.34). However, for processor, channel V was most market efficient (134) and had more shares in consumers' price (100) due to direct selling of produce to consumer.

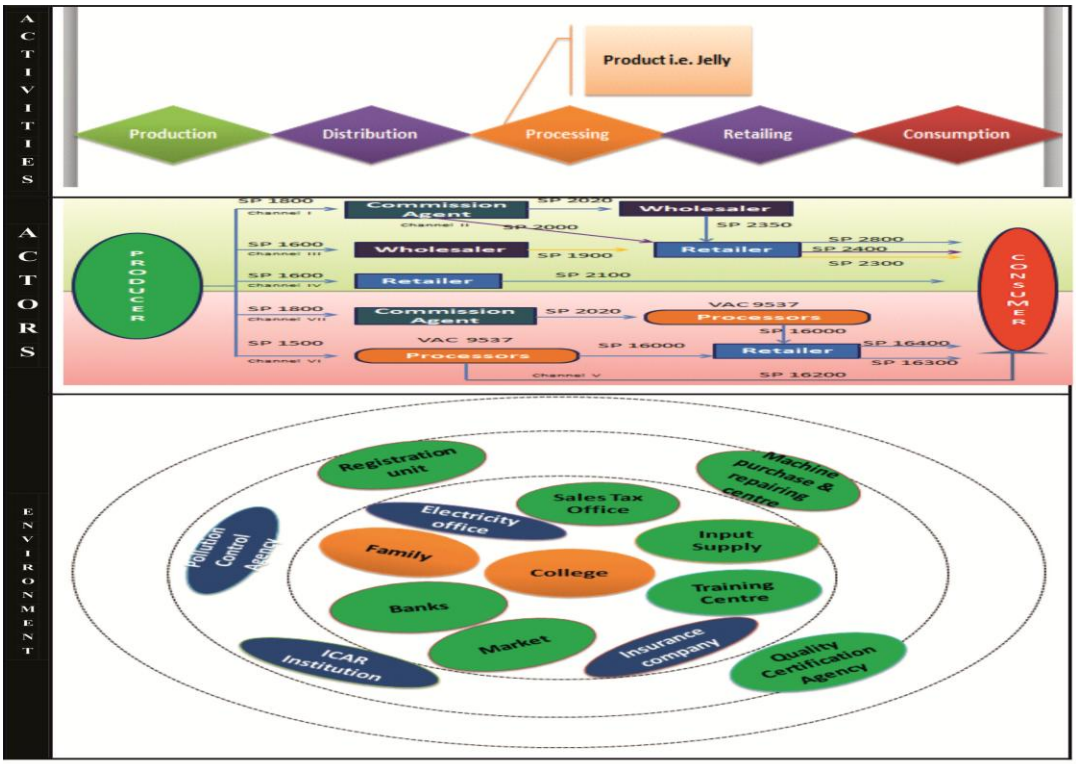

Figure 4.6.2: Representing value chain map of Guava at Allahabad, U.P.

As far as entrepreneurial environment is concerned for guava processor, market, input supply, bank, family support, training centre etc. were within reach of 10 km. The registration centre, ICAR institutes, quality certification and pollution control agency, machine repairing and maintenance centre were within the reach of 20 km. According to importance, most important factors were input supply, market, bank, sales tax, family, training centre, quality certification and registration centre. However, ICAR institution, pollution control agency, electricity office, insurance company were moderately important. It was found that training centre was there related to food processing but they were not maintaining records and follow up programmes.

4.6.3 Value chain mapping for mango at Lucknow, U.P.

From figure 4.6.3 it is clear that the major identified activities of a mango value chain were its production, distribution, processing (mainly into pickles), retailing and finally consumption. Among producer, most efficient channel was IV due to highest market efficiency (20.4) and producers' share in consumers' price (77). From table 4.5.3 it is evident that among processor, most efficient channel was V due to highest processors' share in consumers' price (100) and market efficiency (92.7). This was beacause of direct selling of product.

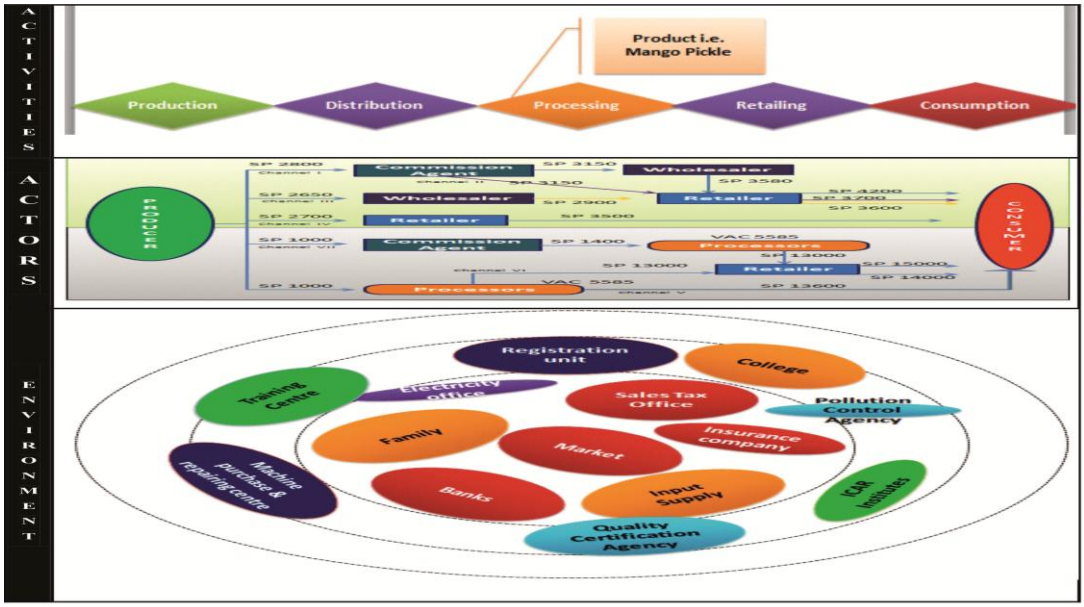

Figure 4.6.3: Representing value chain map for mango at Lucknow, UP

The factors like input supply, bank, market, family support, sale tax office etc. were within the reach of 10 km and ICAR institution, registration centre, training centre, quality certification agency were within the reach of 20 km. Thus, most important factors were input supply, market, bank, training centre, college related to entrepreneurial education and food processing, quality certification agency, registration centre, familiy involvement in processing. Pollution control agency and electricity office were given less importance as in pickle making there is low pollution and low requirement of power supply.

4.6.4 Value chain map of tomato at Indore, M.P.

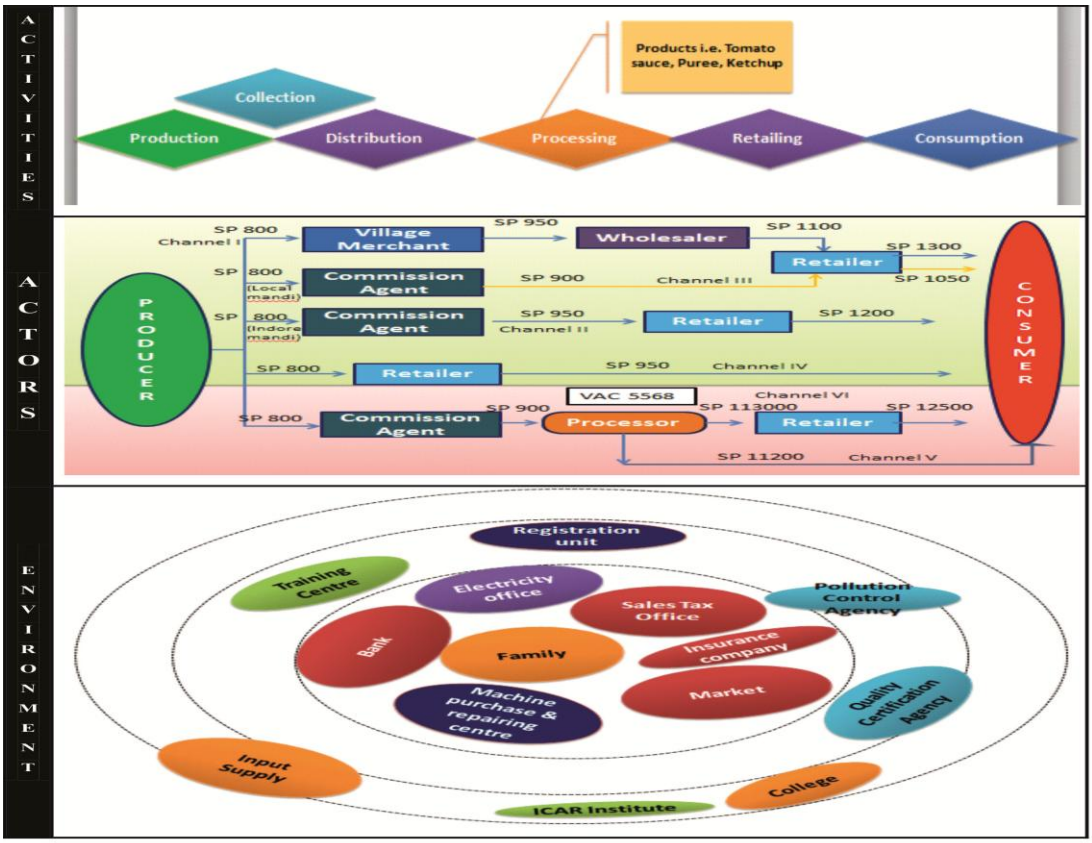

Figure 4.6.4: Representing value chain map of tomato at Indore, MP

From Figure 4.6.4 it is evident that the major identified activities in tomato value chain were production, distribution, processing into sauce, ketchup etc., marketing and consumption. The major channels were identified based on price spread, market efficiency and producers' share in consumers' price. Among producers, most efficient channel was IV due to more share in consumers' price (84%) and more market efficiency (6.2) from table 4.5.4, however, among processors, most efficient channel was V due to direct selling of products. The most

important instutions were identified as input supply, market, bank, quality control centre, family support, machine purchase and repairing centre, electricity office etc. and less important were registration centre (as few were only registered), ICAR institution (less focus on value chain). The institutions like market, family, bank were within the reach of 10 km, however, institution like training centre, college (related to entrepreneurial education, food processing etc.), registration unit were within the reach of 20 km and least important instututes were input supply and ICAR institution. The raw material were supplied from Dhar district which led to high cost of input so, they have diversified their processing unit for other agricultural products also like chilli sauce, soysauce, vinegar etc.

4.6.5 Value chain mapping of potato at Meerut, UP

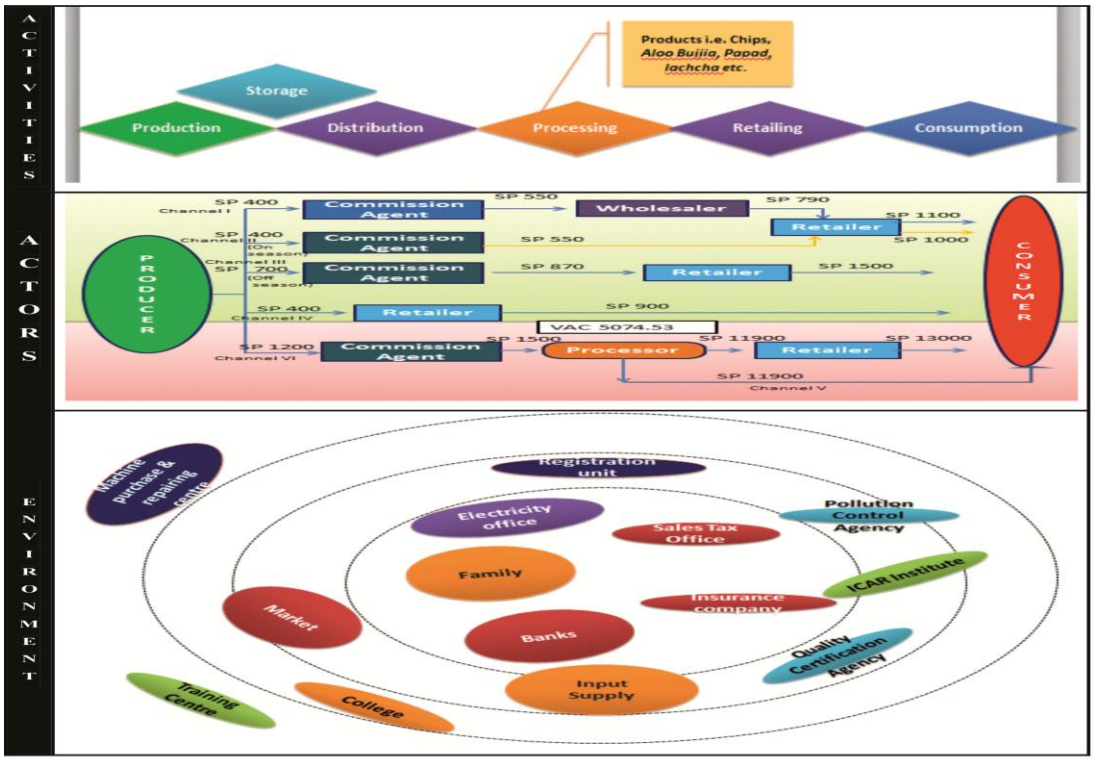

Figure 4.6.5: Representing value chain map of potato at Meerut, UP

The major activities of value chain development in potato were identified as production, storage, sorting, distribution, processing into various products like chips, papad, namkeen etc., retailing it and finally consumption (Figure 4.6.5). The channel III for potato producer and Channel V for potato processor were having highest share in consumers' price (F=46.67, P=100). For marketing efficiency Channel IV for producers (4.92) and channel V for processor (33.49) was high because of reduction

in number of middlemen. In case of producers, producers' share in consumer price (46.67) during off-season selling of potato was more compared to on-season selling due to increase in price of potato during off season whereas, market efficiency was higher for on-season compared to off season due to high marketing cost like storage, sorting and transportation cost of off season potato. For processor, channel V was obtained 100 per cent shared in consumers' price and more market efficiency than channel VI.

As far as entrepreneurial environment was concerned, family support, bank, sales tax office were within the reach of 10 km; market, input supply, quality certification agency, registration unit, ICAR institutions, etc. were within the reach of 20 km and entrepreneurial education at college level was within 30 kn whereas training and machine purchase centre were beyond 30 km. According to importance of institution, the most important institution were family, market, input supply, bank, machine purchase and repairing centre etc. The moderately important was electricity office whereas least important institutions were i.e. registration centre, sale tax office, quality certification agency (few units were only registrered), pollution control agency (due to low or no pollution through enterprise), ICAR Institution (not much support extended to potato processors), training centre (lack of training facility) and college related to food processing and entrepreneurship.

4.6.6 Value chain development of mushroom at Sonepat, Haryana

The major activities for value chain development of mushroom were production of mushroom, distribution, processing it mainly into canned mushroom, marketing and consumption (figure 4.6.6). The major actors were identified and most efficient channel was found out based on price spread, share in consumers' price and market efficiency. In case of producer, most efficient channel was II due to more share in consumers' price (91 %) and more marketing efficiency (34). For processor, most efficient channel was III due to more share in consumer price (93) and more market efficiency (37.43). The most important institutions were input supply, bank, sales tax office, registration unit, entrepreneurial education at college level, training centre, pollution control agency etc. The moderately important instutions were electricity office and insurance company. and ICAR institution was least important due to lack of support in processing. The entrepreneurial education at college level, training centre, input supply, bank, pollution control agency were

within reach of 10 km, quality certification agency, registration centre were within 20 km of reach and others like market, ICAR institutions, machine purchase centre were beyond 20 km.

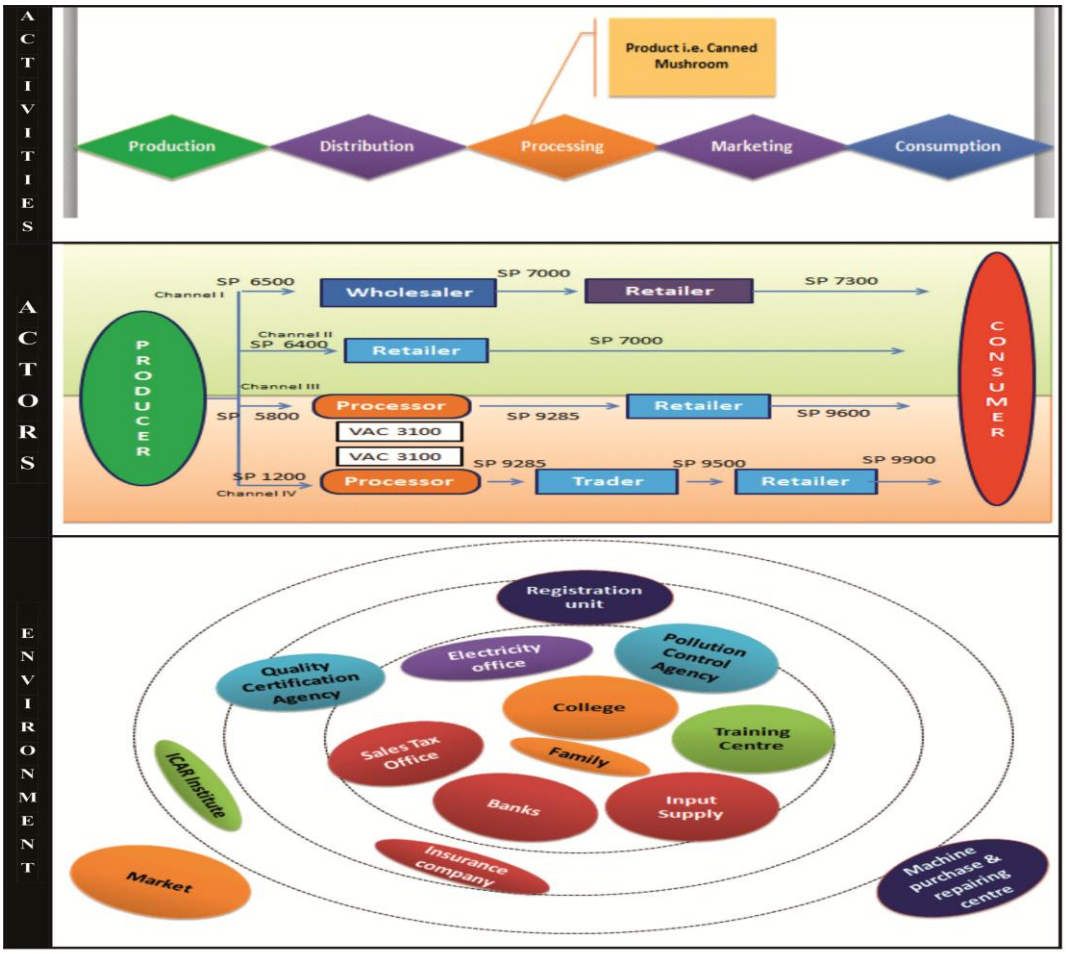

Figure 4.6.6: Representing value chain map of mushroom at Sonepat, Haryana

4.6.7 Value chain mapping of Maize at Samastipur, Bihar

The major activities identified for maize value chain were production, storage, distribution, processing into products like poultry feed, *namkeen*, flour etc., then marketing and consumption (Figure 4.6.7). Then major actors were idenified and most efficient channel was III among producers due to more producers' share in consumers' price (68.75) and market efficiency (20.33) (Table 4.5.7). For processors efficient channels were V, VII &VIII due to more share in consumers' price and market efficiency.

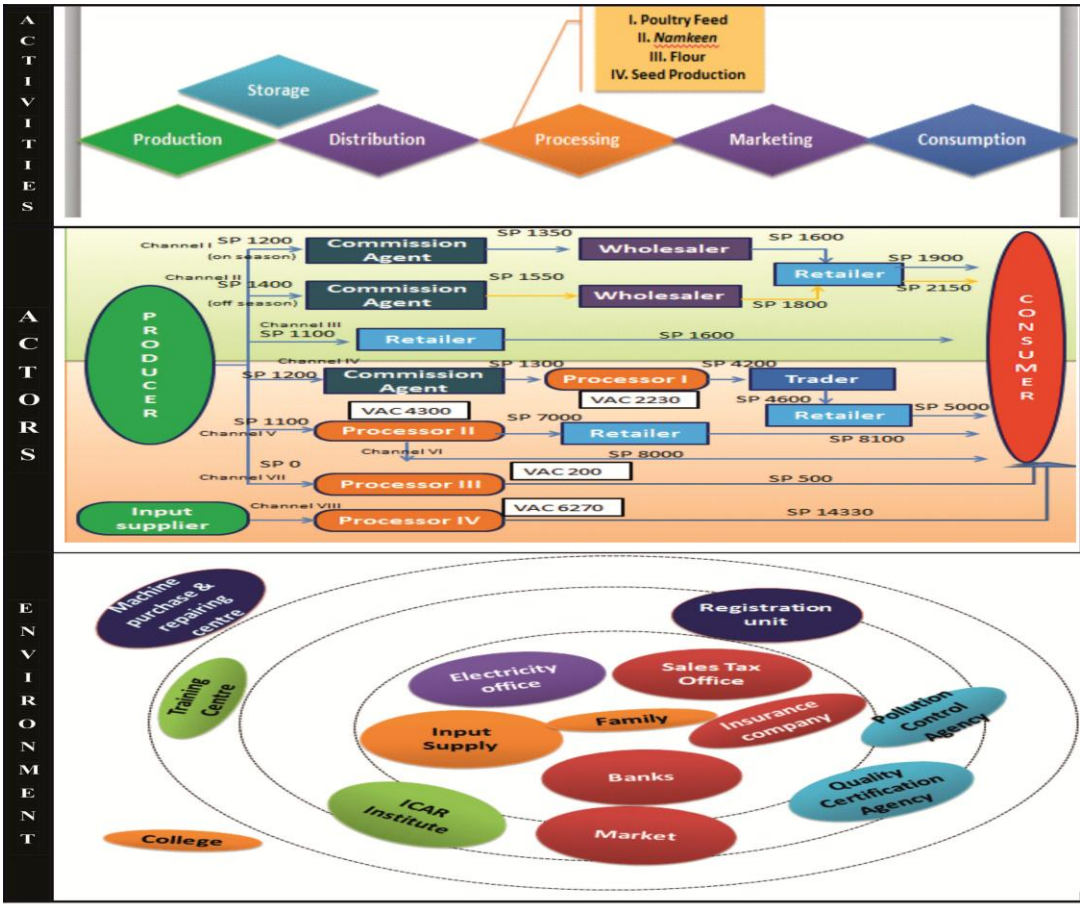

Figure 4.6.7: Representing value chain map of maize at Samastipur, Bihar

The entrepreneurial environment was noticed to be favourable as factors like input supply, banks, sales tax office etc. were within the reachability of 10 km. ICAR instutite, market (distance and direct selling both available), quality certification agency, registration centre were between 10 to 20 km of reachability. Training centre, college related to food processing and machine repairing centre were far. According to importance, the most important institutions were input supply, market, bank, ICAR institutions, quality certification agency, registration unit, electricity office; moderately important institutions were training centre, insurance company and least important was involvement of family in enterprise and entrepreneurial education at college.

4.6.8 Value chain Map of Wheat at Indore, MP

The major activities were identified for value chain of wheat as production, storage, distribution through intermediaries, processing into different products like samolina, *dalia*, cattle feed, bakery products, marketing and finally consumption (Figure 4.6.8). The major actors were identified, then price spead, producers' and

processors' share in consumers' price and market efficiency of different channels were calculated. in case of the producers, the most efiicient market channel was III due to less number of intermediaries as well as highest market efficiency (21) and share in consumer price (87.5). Among processor, most efficienct market channel were IV,V and VIII due to more market efficiency and share in consumers' price (100). As far as entrepreneurial environment was concerned, input supply, family, bank, sales tax office were within 10 km; market, ICAR institution, registration centre were within 20 km of reach and training centre was far. In terms of importance of institutions, most important institutes were input supply, market, bank, family support, registration unit however, least important were training centre and ICAR institute.

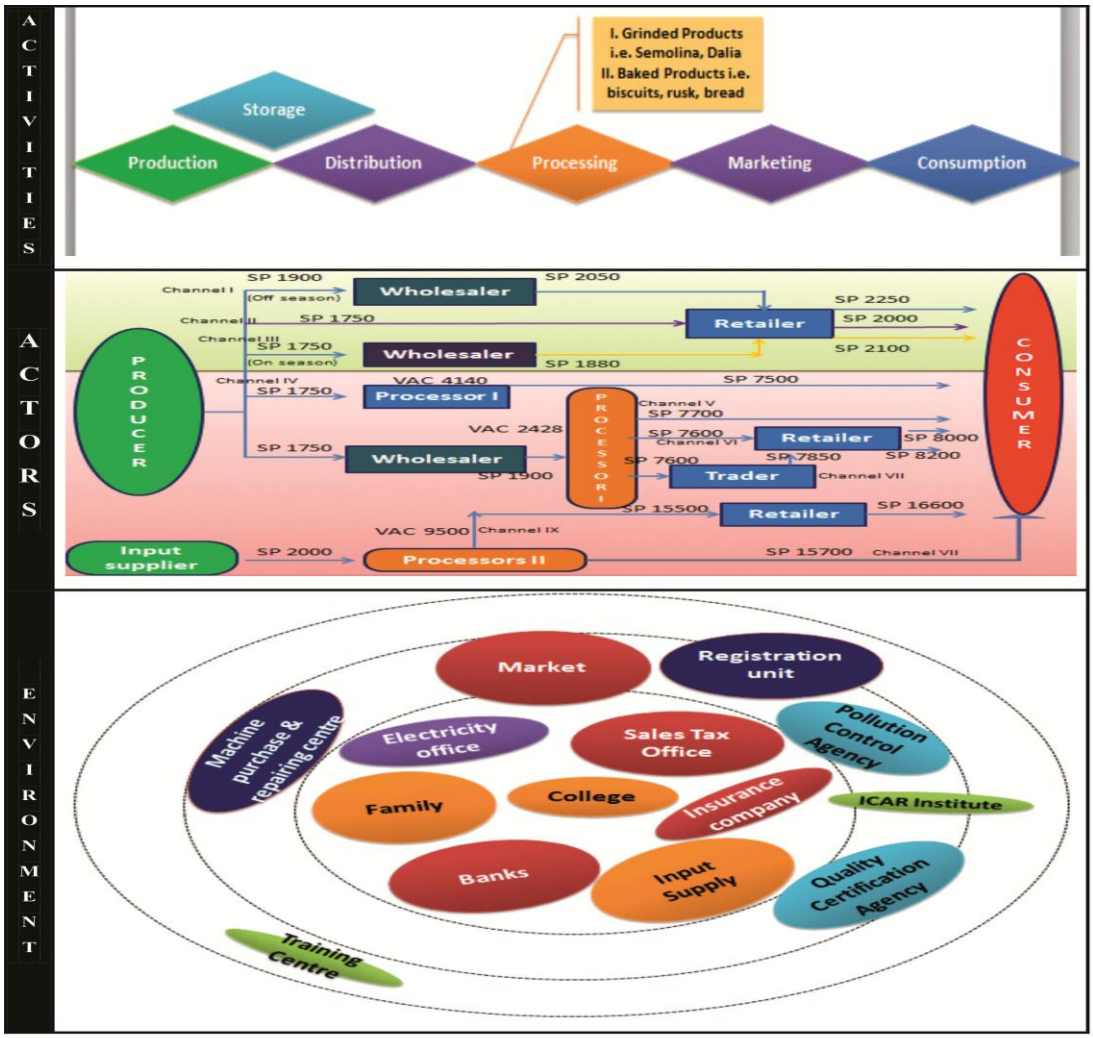

Figure 4.5.8: Representing value chain map of Wheat at Indore, MP

4.6.9 Value chain development of Soybean at Indore, MP

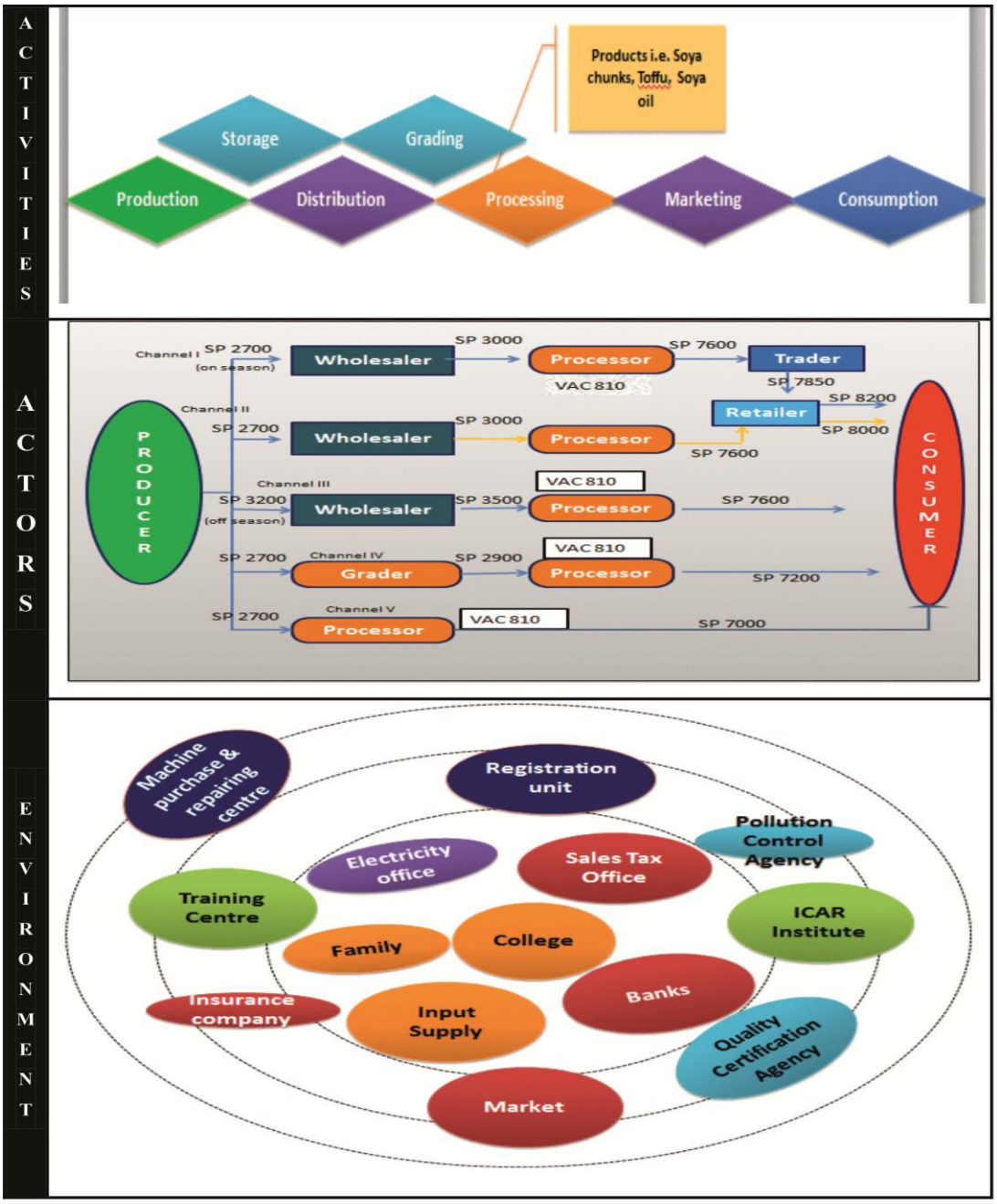

Figure 4.6.9: Representing value chain map of Soybean at Indore, MP

The major activities were identified for soybean processors from Figure 4.6.9 which were production, storage, distribution, grading, processing, marketing and consumption. The major actors were also identified as well as market efficiency and high share in consumers' price was calculated. So, the most efficient channel was identified as III for both processor and producer due to high market efficiency (.85) and share in consumers' price . The entrepreneurial environment were identified, so

within the reach of 10 km the institutions were input supply, banks, family, sales tax office, within 20 km of reach institutions were registration unit, ICAR institute, market, training centre and beyond that machine purchase centre. The most important institutes were input supply, bank, market, ICAR institutes, sales tax office, quality certification agency, training centre, entrepreneurial education at college or school level etc. The moderately important institues were pollution control agency, insurance company, family, electricity office.

4.7 Identification and comparison of training needs among processors to improve their competency for upgrading value chain

4.7.1 Preferred Training need among fruit processors in all dimensions

4.7.1(A) Preferred training need in market dimension among fruit processors to improve their competency for upgrading value chain

Table 4.7.1(A): Preferred training need in market dimension among fruit processors as per Friedman test

S. No	Statements	*Aonla* X^2 102.5 (14)p<0.05	Guava X^2 102.5 (14)p<0.05	Mango X^2 102.5 (14) p<0.05
A	**Marketing Dimension**			
I.	**Product**	**2.43**	**3.22**	**3.72**
1.	Selection of agricultural commodities	4.23	5.03	8.2
2.	Designing or planning of types of value added products that can be developed	3.40	5.53	12.6
3.	No need of training to determining features of value added product i.e. size, quality, appearance etc.*	7.63	7.73	6
4.	Technology used in processing and packaging value added products	6.27	10.53	4.13
5.	Determining branding of value added products	6.27	5.5	8.9
6.	Deciding nutritional value of products and using natural ingredients	3.37	11.86	10.53
II.	**Pricing**	**3.5**	**3.5**	**2.78**
7.	No need for training to estimate cost of value added products*	5.83	5.83	4.16

8.	Pricing of products and fixing discounts on it	10.13	6.5	10.33
9.	Identifying price differences among target customer groups	10.53	10.63	6.56
10.	Determining the competition for the products	10.13	10.70	6.7
III.	**Place**	**3.62**	**3.37**	**3.6**
11.	No need of training to identify enterprise opportunities and its premises*	8.67	4.96	8.73
12.	No need of training to identify distribution of product through direct selling or intermediaries involvement*	10.97	8.7	8.96
13.	No need of training to determine potential customers as well as point and volume of sale*	9.23	9.7	10.93
IV.	**Promotion**	**4.16**	**3.43**	**2.7**
14.	Strategies for promotion i.e. free sample, coupon, contests, incentives, loyalty programmes	10.70	9.73	7.3
15.	No need of training for online purchasing facility of value added products*	12.63	7.03	5.93

Table 4.7.1(A) indicates that in case of *aonla* processor, the most required area of training was found to be online marketing of value added products followed by distribution of products through direct marketing or intermediaries' involvement. For *aonla* processor, the most important sub-dimension of training need was found to be promotion (4.16) followed by place (3.63), price (3.5) and products (2.4). However, in case of guava processors, deciding the nutritional value of product and using natural ingredient followed by determining competition of product were found to be important area of training need. Within sub-dimension of market, guava processors were found to be having highest training need for pricing (3.5), followed by place (3.37), promotion (3.43), and product (3.22). In case of mango processor, the most required training need was found to be various value added products that can be developed from mango, followed by identifying the potential customer as well as point and volume of sale. Within sub-dimension, the preferred area was found to be product (3.72) followed by place (3.6), price (2.78) and promotion (2.7).

4.7.1(B) Preferred area of training need in technical dimension among fruit processors to improve their competency for upgrading value chain

Table 4.7.1(B): Preferred area of training need within technical dimension among fruit processors as per Friedman test

S. No.	Technical Dimension	*Aonla* X2 127.21 (13)p<0.05	Guava X^2 89.11 (13)p<0.05	Mango X^2 75.28 (13)p<0.05
I	**Inputs**	**3.35**	**4.28**	**4.06**
1.	Determining sources, price trends, demand and supply of critical raw materials	7.33	7.86	4.93
2.	No need of awareness about international/national standards, regulations and laws of agricultural technology*	8.50	6.36	6.86
3.	No need of training to use appropriate and modern technology for processing*	10.83	11.43	11.03
4.	No need of training for developing innovative value added products or services*	5.90	11.067	12.43
II	**Infrastructure**	**2.73**	**4**	**3.06**
5.	No need of training to determine cost effectiveness of storage capacity*	6.23	8.43	5.73
6.	No need of training for estimating cost effectiveness of cold chain facility*	5.63	7.6	4.6
III	**Finance**	**3.88**	**3.97**	**3.75**
7.	Effective financial planning including balance sheet, profit and loss statements etc.	12.17	12.23	10.76
8.	Forecasting the need for additional capital for agri-enterprise	8.47	9.06	5.36
9.	No need of training to identify the credits availability, sources, types and rules as well as procedures to avail it*	9.03	4.6	7.06
IV	**Legal**	**1.62**	**3.28**	**3.57**
10.	Registration of agri-enterprise	2.80	5.7	5.2
11.	No need of training to obtained appropriate licenses*	2.83	4.6	7.06
12.	Knowing different food quality and safety standards	3.03	5.43	9.06
V	**Managerial**	**4.26**	**3.43**	**3.7**
13.	Need of training for enhancing decisions making skills	9.53	5.20	6.96
14.	Need for exposure for networking skills	12.70	6.53	7.93

Table 4.7.1(B) indicates that within technical dimension, in case of *aonla* processor, the preferred area of training need was found to be networking skill (12.70) followed by effective financial planning (12.17). The preferred sub-

dimension of technical training needs were managerial (4.26) followed by finance (3.88), inputs (3.35), infrastructure (2.73) and legal (1.62). However, in case of guava processor, most preferred area was found to be effective financial planning (12.23) followed by use of modern technology and developing innovative value added products or services (11.43). The preferred sub-dimensions included input (4.28) followed by infrastructure (4), finance (3.75), managerial (3.43) and legal (3.28). For mango processor, preferred area was observed as developing innovative products or services (12.43) and preferred sub-dimensions were input (4.06) followed by finance (3.75), managerial (3.7), legal (3.57) and infrastructure (3.06).

4.7.1(C) Preferred training need in information dimension among fruit processors to improve their competency for upgrading value chain

Table 4.7.1(C): Preferred area of training need within information dimension among fruit processors as per Friedman test

S. No	**Information**	***Aonla*** X^2 47.08 (5)p<0.05	**Guava** X^2 21.17 (5)p<0.05	**Mango** X^2 38.73 (5)p<0.05
1.	Information and support for agri-start-up, its expansion and diversification	4.16	4.1	5.4
2.	Marketing information about prices, flow of products, food processing units etc.	1.53	3.2	3.3
3.	Need of information regarding new technology from governments etc.	2.4	4.93	4.5
4.	No need of information regarding post-harvest management of agricultural produce*	4.66	3.43	2.16
5.	No need of training for searching and utilising data from patent information, innovation information and other sources of knowledge*	4.86	2.83	2.76
6.	Understanding of the different ethical issues that exists in relation to enterprise and its utilisation	3.36	2.5	2.8

Table 4.7.1(C) shows that in case of information as a dimension of training need, the *aonla* processor preferred most training need in the area of searching and utilising data from patent information, innovation information and other sources of knowledge (4.86), whereas, guava processor needed information in the area of new technology (4.93) and mango processor required information and support for agri-start-up, its expansion and diversification (5.4).

4.7.1(D) Preferred area of training need in social responsibility dimension among fruit processors to improve their competency for upgrading value chain

4.7.1(D): Preferred area of training need in social responsibility dimension among fruit processor as per Friedman test

D	**Social Responsibility**	***Aonla*** X^2 39.93 (4)p<0.05	**Guava** X^2 31.54 (4),p<0.05	**Mango** X^2 32.26 (4)P<0.05
1.	No need of training to provide conducive working environment for work culture*	3.7	2.96	2.5
2.	Effective utilization of funds and resources	2.9	3	4.43
3.	No need of training for prevention of environmental pollution*	1.16	1.26	1.9
4.	No need of training to reducing deleterious effects of products on human health*	4.36	3.56	3.73
5.	To comply with government rules, procedures and legal requirements	2.86	4.2	2.3

Table 4.7.1(D) illustrates that social responsibility as one of the dimension of training need. For a*onla* and guava processors preferred training need were found to reduce deleterious effect of products on human health (4.36 & 3.56) whereas for mango processors' preferred area of training was observed to be effective utilization of funds and resources (3.73).

4.7.2 Preferred area of training need in all dimensions among vegetable processors

4.7.2 (A) Preferred area of training need in market dimension among vegetable processors

Table 4.7.2 (A) Preferred area of training need in market dimension among vegetable processors to upgrade value chain as per Friedman test

S. No	Statements	Tomato X^2 70.89 (14)p<0.05	Potato X^2 85.72 (14)p<0.05	Mushroom X^2 112.7 (14)p<0.05
A	**Marketing Dimension**			
I.	**Product**	**3.5**	**3.64**	**3.46**
1.	Selection of agricultural commodities	8.2	11.7	1.76
2.	Designing or planning of types of value added products that can be developed	12.6	7.4	13.3
3.	No need of training to determining features of value added product i.e. size, quality, appearance etc.*	6	7.03	8.53
4.	Technology used in processing and packaging value added products	4.13	8.5	7.1
5.	Determining branding of value added products	8.9	5.33	7.06
6.	Deciding nutritional value of products and using natural ingredients	10.53	5.46	8.46
II.	**Pricing**	**3.78**	**3.25**	**3.68**
7.	No need for training to estimate cost of value added products*	4.16	3.26	3.73
8.	Pricing of products and fixing discounts on it	10.33	7.067	7.4
9.	Identifying price differences among target customer groups	6.56	6.4	10.83
10.	Determining the competition for the products	6.7	9.33	11.96
III.	**Place**	**4.15**	**3.8**	**3.24**
11.	No need of training to identify enterprise opportunities and its premises*	8.7	5.3	4.4
12.	No need of training to identify distribution of product through direct selling or intermediaries involvement*	8.96	10.6	6.1
13.	No need of training to determine potential customers as well as point and volume of sale*	10.93	9	9.76
IV.	**Promotion**	**4.26**	**4.63**	**4.1**
14.	Strategies for promotion i.e. free sample, coupon, contests, incentives, loyalty programmes	7.3	9	9.76
15.	No need of training for online purchasing facility of value added products*	5.93	11.13	9.8

Table 4.7.2(A) illustrates that within market dimension of training need for tomato processor, types of value added product from tomato (12.6) followed by potential customer as well as point and volume of sale (10.93) were found to be preferred area. However, for potato processors, online marketing (11.13) and selection of agricultural commodities (11.07) were observed to be preferred area. The reason for 'selection of agricultural commodities' as preferred area of training need due to irregular and high cost of suitable variety of potato in Meerut. In case of mushroom processors, the preferred area was noticed for types of value added product (13.3) that can be possible, as presently, the processors were restricted to canned mushroom only instead of various potential for value addition in mushroom. Within sub-dimension, promotion was found to be most preferred area due to trend of online marketing in present scenario.

4.7.2 (B) Preferred area of training need in technical dimension among vegetable processors

Table 4.7.2 (B): Preferred area of training need in technical dimension among vegetable processors to upgrade value chain as per Friedman test

B	**Technical Dimension**	Tomato X2 75.28 (13)p<0.05	Potato X^2 55.65 (13)p<0.05	Mushroom X^2 143.51 (13)p<0.05
I	**Inputs**	**3.8**	**4.11**	**3.73**
1	Determining sources, price trends, demand and supply of critical raw materials	4.9	10.46	1.86
2	No need of awareness about international/national standards, regulations and laws of agricultural technology*	6.83	6.23	9.3
3	No need of training to use appropriate and modern technology for processing*	11.03	8.2	11.16
4	No need of training for developing innovative value added products or services*	12.43	7.4	12.76
II	**Infrastructure**	**4.46**	**3.76**	**2.36**
5	No need of training to determine cost effectiveness of storage capacity*	5.73	8.86	4.23
6	No need of training for estimating cost effectiveness of cold chain facility*	4.6	5.03	4.5
III	**Finance**	**3.86**	**3.57**	**3.35**
7	Effective financial planning including balance sheet, profit and loss statements etc.	10.76	7.13	9.76
8	Forecasting the need for additional capital for agri-enterprise	5.36	5.2	9.06

9	No need of training to identify the credits availability, sources, types and rules as well as procedures to avail it*	7.06	5.5	3.33
IV	**Legal**	**3**	**4.26**	**3.02**
10	Registration of agri-enterprise	5.2	8.9	3.43
11	No need of training to obtained appropriate licenses*	7.06	6.56	6.8
12	Knowing different food quality and safety standards	9.06	11.8	8.43
V	**Managerial**	**3.2**	**3.8**	**4.26**
13	Need of training for enhancing decisions making skills	6.96	7.9	9.06
14	Need for exposure for networking skills	7.93	5.73	11.16

Table 4.7.2 (B) represents that in case of tomato and mushroom processors, the preferred areas of training need were developing innovative value added product or services (12.43 & 12.76) followed by modern processing technology (11.03). For potato processors, food quality and safety standards (11.8) followed by determining sources, price trends, demand and supply of potato (10.46) were preferred area.

4.7.2 (C) Preferred area of training need in information dimension among vegetable processors to upgrade value chain

4.7.2 (C): Preferred area of training need in information dimension among vegetable processors to upgrade value chain as per Friedman test

S. No	**Information**	Tomato X^2 38.73 (5)p<0.05	Potato X^2 39.45 (5)p<0.05	Mushroom X^2 11.07 (5)p<0.05
1	Information and support for agri-start-up, its expansion and diversification	5.46	4.63	5.73
2	Marketing information about prices, flow of products, food processing units etc.	3.3	5.13	4.23
3	Need of information regarding new technology from governments etc.	4.5	2.06	3.86
4	No need of information regarding post-harvest management of agricultural produce*	2.16	3.7	2.46
5	No need of training for searching and utilising data from patent information, innovation information and other sources of knowledge*	2.76	2.83	3.2
6	Understanding of the different ethical issues that exists in relation to enterprise and its utilisation	2.8	2.63	1.5

Table 4.7.2 (C) clearly indicates that tomato and mushroom processors required information regarding enterprise expansion and diversification (5.46 & 5.73) whereas potato processors needed information regarding marketing information (5.13).

4.7.2 (D) Preferred area of training need in social responsibility dimension among vegetable processors to upgrade value chain

Table 4.7.2 (D): Preferred area of training need in social responsibility dimension among vegetable processors to upgrade value chain as per Friedman test

D	**Social Responsibility**	Tomato X^2 30.96 (4)p<0.05	Potato X^2 18.22 (4)p<0.05	Mushroom X^2 23.76 (4)p<0.05
1	No need of training to provide conducive working environment for work culture*	1.9	2.33	1.96
2	Effective utilization of funds and resources	2.9	3.16	4.1
3	No need of training for prevention of environmental pollution*	2.2	2.43	2.83
4	No need of training to reducing deleterious effects of industrial products on human health*	4.36	2.73	3.83
5	To comply with government rules, procedures and legal requirements	3.63	4.33	2.26

In case of social responsibility, Table 4.7.2.D. illustrates that tomato processor preferred training need for reducing deleterious effect of value added products on human health (4.36) whereas, potato processor preferred training regarding compliance with government rules, procedures and legal requirements (4.33). The mushroom processor wanted training for effective utilization of fund and resources (4.1).

4.7.3 Preferred area of training need in all dimension among food grain processors

4.7.3(A) Preferred area of training need in marketing dimension among food grain processors to upgrade value chain

Table 4.7.3(A): Preferred area of training need in marketing dimension among food grain processors to upgrade value chain as per Friedman test

S. No	Statements	Maize X^2 95.64 (14)p<0.05	Wheat X^2 92.54 (14)p<0.05	Soybean X^2 124.54 (14),p<0.05
A	**Marketing Dimension**			
I.	**Product**	**3.3**	**3.24**	**3.48**
1	Selection of agricultural commodities	2.4	2.53	4.2
2	Designing or planning of types of value added products that can be developed	7.5	8.56	12.7
3	No need of training to determining features of value added product i.e. size, quality, appearance etc.*	8.03	7.36	8.33
4	Technology used in processing and packaging value added products	9.3	8.73	10.4
5	Determining branding of value added products	3.1	4.63	4.56
6	Deciding nutritional value of products and using natural ingredients	8.8	12.46	11.3
II.	**Pricing**	**3.85**	**3.45**	**3.2**
7	No need for training to estimate cost of value added products*	7.4	4.26	1.96
8	Pricing of products and fixing discounts on it	8.5	9.1	9.53
9	Identifying price differences among target customer groups	11.2	11.73	6.7
10	Determining the competition for the products	6.2	7.56	12.1
III.	**Place**	**3.75**	**3.77**	**3.55**
11	No need of training to identify enterprise opportunities and its premises*	4.86	6.26	4.76
12	No need of training to identify distribution of product through direct selling or intermediaries involvement*	10.53	11.06	11.5
13	No need of training to determine potential customers as well as point and volume of sale*	9.23	10.76	9.16
IV.	**Promotion**	**4.63**	**3.3**	**2.9**
14	Strategies for promotion i.e. free sample, coupon, contests, incentives, loyalty programmes	11.36	7.1	6.83
15	No need of training for online purchasing facility of value added products*	11.46	7.83	5.9

Table 4.7.3 (A) indicates that maize processors required training mainly in the area of promotion for promoting online marketing facility (11.46), however, wheat processor wanted training for increasing the nutritional value of their processed product followed by determining prices of their products among target consumer. Soybean processors were interested in training need for developing

different type of value added products (12.7) followed by determining the competition (12.1).

4.7.3 Preferred area of training need in technical dimension among vegetable processors to upgrade value chain

Table 4.7.3(B): Preferred area of training need in technical dimension among vegetable processors to upgrade value chain as per Friedman test

B	Technical Dimension	Maize X2 134.07 (13)p<0.05	Wheat X^2 132.27 (13)p<0.05	Soybean X^2 146.05 (13)p<0.05
I	**Inputs**	**4.25**	**3.98**	**4.31**
1	Determining sources, price trends, demand and supply of critical raw materials	7.66	5.83	8.06
2	No need of awareness about international/national standards, regulations and laws of agricultural technology*	9.46	8.8	9.8
3	No need of training to use appropriate and modern technology for processing*	10.46	11.43	11.6
4	No need of training for developing innovative value added products or services*	11.76	12.5	12.3
II	**Infrastructure**	**2**	**2.76**	**1.93**
5	No need of training to determine cost effectiveness of storage capacity*	4.2	4.83	4.26
6	No need of training for estimating cost effectiveness of cold chain facility*	2.2	6.3	4.6
III	**Finance**	**3.97**	**3.51**	**3.11**
7	Effective financial planning including balance sheet, profit and loss statements etc.	10.5	11.43	11.2
8	Forecasting the need for additional capital for agri-enterprise	9.26	9.5	7.36
9	No need of training to identify the credits availability, sources, types and rules as well as procedures to avail it*	7.16	3.46	3.4
IV	**Legal**	**2.26**	**2.24**	**1.71**
10	Registration of agri-enterprise	2.2	1.83	2.36
11	No need of training to obtained appropriate licenses*	3.26	3.56	3.86
12	Knowing different food quality and safety standards	6.5	6.93	5.167
V	**Managerial**	**4.36**	**3.9**	**4.3**
13	Need of training for enhancing decisions making skills	9.1	8.73	9.533
14	Need for exposure for networking skills	11.2	9.833	11.46

In case of technical dimension of training need, the maize processors desired training in the areas of developing more value added products (11.76) as in Samastipur, the processing was limited to poultry feed, namkeen and flour only instead of huge potential of maize processing like sweet corn, baby corn, popcorn

etc. The maize processors were interested in increasing their networking skill (11.2) and developing effective financial sheet (10.5) through training (Table 4.7.3 B). Soybean and wheat processor had also shown their interest for developing innovative value added products or services (12.5 and 12.3), learning about modern processing technologies (11.43 and 11.6) and making effective financial statements (11.43 and 11.2).

4.7.3 (C) Preferred area of training need in information dimension among vegetable processors to upgrade value chain

Table 4.7.3 (C): Preferred area of training need in information dimension among vegetable processors to upgrade value chain as per Friedman test

S. No	**Information**	Maize X^2 49.42 (5)p<0.05	Wheat X^2 37.59 (5)p<0.05	Soybean X^2 31.60 (5)p<0.05
1	Information and support for agri-start-up, its expansion and diversification	5.06	5.4	3.8
2	Marketing information about prices, flow of products, food processing units etc.	1.66	2.8	4.06
3	Need of information regarding new technology from governments etc.	4.8	4.13	3.4
4	No need of information regarding post-harvest management of agricultural produce*	2.83	1.83	1.7
5	No need of training for searching and utilising data from patent information, innovation information and other sources of knowledge*	4.3	3.8	5.1
6	Understanding of the different ethical issues that exists in relation to enterprise and its utilisation	2.34	3.03	2.9

For information as dimension of training need, both maize and wheat processors were interested in training for information and support of agri-start up, its expansion and diversification (5.06 and 5.4). Whereas, soybean processor were interested in how to search and utilize data from patents or other authorized sources (5.1) (table 4.7.3 C).

4.7.3 (D) Preferred area of training need in social responsibility dimension among food grain processors to upgrade value chain

Table 4.7.3(D): Preferred area of training need in social responsibility dimension among food grain processors to upgrade value chain as per Friedman test

D	**Social Responsibility**	Maize X^2 49.73 (4)p<0.05	Wheat X^2 9.72 (4)p<0.05	Soybean X^2 27.56 (4)p<0.05
1	No need of training to provide conducive working environment for work culture*	3.8	2.76	2.2
2	Effective utilization of funds and resources	4.7	3.46	3.66
3	No need of training for prevention of environmental pollution*	2.26	2.93	1.8
4	No need of training to reducing deleterious effects of industrial products on human health*	1.3	3.63	3.13
5	To comply with government rules, procedures and legal requirements	2.93	2.20	4.2

As per Table no 4.7.3 (D), maize processors were interest in effective utilization of funds and resources (4.7) whereas wheat processors had shown their interest for reducing deleterious effects of their processed products on human health (3.6). The soybean processors wanted to comply with government rule, procedures and legal requirement (4.2) as social responsibility dimension of training need.

4.7.4 Preferred major dimensions of training need among processors

Table 4.7.4: Preferred major dimensions of training need in each type of processors as per Friedman mean rank

A	**Fruit Processor**	***Aonla* (n=15)**		**Guava (n=15)**		**Mango (n=15)**	
S No	**TNA Dimension**	**Mean of rank*** ** X^2 43.5 (3)	**Group**	**Mean of rank*** ** X^2 41.4 (3)	**Group**	**Mean of rank*** ** X^2 42.92 (3)	**Group**
1	Market	3.86	A	3.3	A	3.13	A B
2	Technical	3.13	A B	3.7	A	3.86	A

3	Information	2.00	B C	2.00	B	2.00	B C
4	Social responsibility	1.00	C	1.00	B	1.00	C
B	**Veg Processor**	**Tomato (n=15)**		**Potato (n=15)**		**Mushroom (n=15)**	
S No	**TNA Dimension**	**Mean of rank*** X^2 45 (3)**	**Group**	**Mean of rank*** X^2 40.20 (3)**	**Group**	**Mean of rank*** X^2 39.96 (3)**	**Group**
1	Market	4.00	A	3.53	A	3.93	A
2	Technical	3.00	A B	3.46	A	3.06	A
3	Information	2.00	B C	1.96	B	1.63	B
4	Social responsibility	1.00	C	1.03	B	1.36	B
C	**Food grain Processor**	**Maize (n=15)**		**Wheat (n=15)**		**Soybean (n=15)**	
S No	**TNA Dimension**	**Mean of rank*** X^2 43.80(3)**	**Group**	**Mean of rank*** X^2 43.0(3)**	**Group**	**Mean of rank*** X^2 40.93(3)**	**Group**
1	Market	3.93	A	3.96	A	3.76	A
2	Technical	3.06	A B	3.03	A B	3.23	A
3	Information	2.00	B C	1.83	B C	1.93	B
4	Social responsibility	1.00	C	1.16	C	1.06	B

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

Table 4.7.4 shows that among fruit processors, the *aonla* processor (3.86) preferred the most important dimension of training as market due to their lack of exposure to online market, distant selling of products, determining competition in market etc. However, guava (3.7) and mango processors (3.8) had preferred for technical dimension of training need due to their need for developing innovative value added products or services, learning new processing technology and developing effective financial statement. Among vegetable and food grain processors, all had shown their interest for marketing dimension as training need. Due to their need to diversify their value added products, identify potential customer as well as point and volume of sale and learn online marketing and other promotional strategies.

4.7.5 Agreement among all types of Processors for various dimensions of training need

Ho: There was no agreement among different types of processor for training need in its various dimensions to promote value chain

H1: There was agreement among different types of processor for various dimensions of training need to promote value chain

Table 4.7.5: Agreement among different types of processors for training need as per Kendall concordance test (n=9)

Dimensions of training need	**Mean Rank*** X^2 25.13 (3)**
Marketing	3.78
Technical	3.22
Information	2.00
Social responsibility	1.00

(Kendall's concordance coefficient W: 0.931 and N=9)
***significant at <0.001 per cent level

Table 4.7.5 shows that there was significant agreement as per Kendall's concordance coefficient (W= 0.931 at X^2 25.13 (3); p <0.001) among nine types of processors that marketing dimension (3.78) was the major dimension of training need. After marketing, processors agreed for technical dimension (3.22) followed by information dimension (2) and social responsibility (1) for training need.

Table 4.7.6: Summary of four dimension of training need among all processors as per Kruskal walis

Market		**Technical**		**Information**		**Social responsibility**	
Processor	Mean Rank X^2 65.64 (8)p<0.05	Processor	Mean Rank X^2 85.74 (8)p<0.05	Processor	Mean Rank *X2* 67.33 (8)p<0.05	Processor	Mean Rank X^2 51.23 (8)p<0.05
Tomato	109.26^{a}	Potato	115.50^{a}	Guava	112.06^{a}	Mushroom	97.66^{a}
Maize	97.20^{ab}	Guava	105.46^{ab}	*Aonla*	102.60^{a}	Tomato	93.76^{a}
Potato	95.33^{ab}	Mango	91.63^{abc}	Mango	83.16^{ab}	*Aonla*	90.90^{ab}

Mushroom	79.26^{ab}	Tomato	84.53^{abcd}	Tomato	82.03^{ab}	Potato	76.56^{abc}
Wheat	59.46^{bc}	Maize	65.20^{abcde}	Potato	69.50^{abc}	Mango	76.36^{abc}
Guava	57.36^{bc}	Mushroom	51.63bcde	Soybean	53.00^{bc}	Guava	64.00^{abc}
Soybean	53.46^{bc}	Wheat	44.06^{cde}	Maize	40.66^{bc}	Wheat	47.20^{bc}
Aonla	30.76^{c}	*Aonla*	27.36^{de}	Wheat	35.26^{c}	Maize	33.20^{c}
Mango	29.86^{c}	Soybean	26.60^{e}	Mushroom	33.70^{c}	Soybean	32.33^{c}

Mean ranks having same letters are not significantly different

Table 4.7.6 clearly represents that in case of market, tomato processor (109.26) had shown highest interest for training need due to their desire to develop more value added product from tomato, however Maize processors (97.20) were interested in promoting their products through online market and other schemes. In case of technical dimension, Potato (115.5) and Guava processors (105.46) had shown more interest because of their need for effective financial planning followed by use of modern technology and developing innovative value added products or services. In case of information, guava (112.06) and *aonla* processors (102.60) had shown more desire for training due to their requirement for information and support to agri-start up, its expansion and diversification. Other reasons were their need of information about new technology and how to search and utilize data from authorized sources. Mushroom (97.66) and tomato processors (93.76) had shown high interest in social responsibility dimension of training need due to need of effective utilization of funds and resources, reduce the deleterious effect of processed product on human health and to comply with government rules.

4.8 Clustering of different types of processors according to four dimensions of Training Need

Hierarchical Agglomerative Clustering (HAC) technique was used to cluster the types of processors for training need. It is a bottom-up approach, it starts by adding a cluster for each of the observations to be clustered, followed by iterative pair-wise merging of clusters until only one cluster is left at the top of the hierarchy. For clustering the different processors in each dimension (Market, Technical, Information and Social responsibility) of training need, ward method followed by Euclidean distance was used as it is based on minimum variance or error sum of square within cluster. Within the cluster there was similarity for that dimension of

training need and between the clusters there was dissimilarity. The graphical representation of HAC is called dendrogram which is a tree like structure, starting with groups of leaves form branches, branches merge into limbs and eventually into tree.

4.8.1 Clustering of different types of processors according to market dimension of training need

Table 4.8.1: Representation of the obtained clusters in marketing dimension of training need

Class	**Cluster 1**	**Cluster 2**	**Cluster 3**
Objects	3	5	1
Sum of weights	3	5	1
Within-class variance	1198.66	1042.80	0.000
Minimum distance to centroid	23.12	19.88	0.000
Average distance to centroid	27.91	28.45	0.000
Maximum distance to centroid	34.0	33.8	0.000
	Aonla Processor Tomato Processor Potato Processor	Guava Processor Mushroom Processor Maize Processor Wheat Processor Soybean Processor	Mango Processor

From Figure 4.8.1 and Table 4.8.1 it was evident that nine types of processors were clustered into three clusters based on minimum variance within cluster. It indicates that *aonla*, tomato and potato processors of cluster 1 had similar training need within market dimension. The probable reasons might be due to similar training need for determining prices and discounts of processed products, competition in market and price differences among target customer. In cluster 2 five processors form the cluster, namely, Guava, Mushroom, Maize, Wheat and Soybean processors were included. This might be due to same training requirement for determining different types of products that can be developed, learning nutritional value of products, new processing technology and online marketing. The third cluster included mango processor due to their higher training need for determining potential customers as well as point and volume of sale.

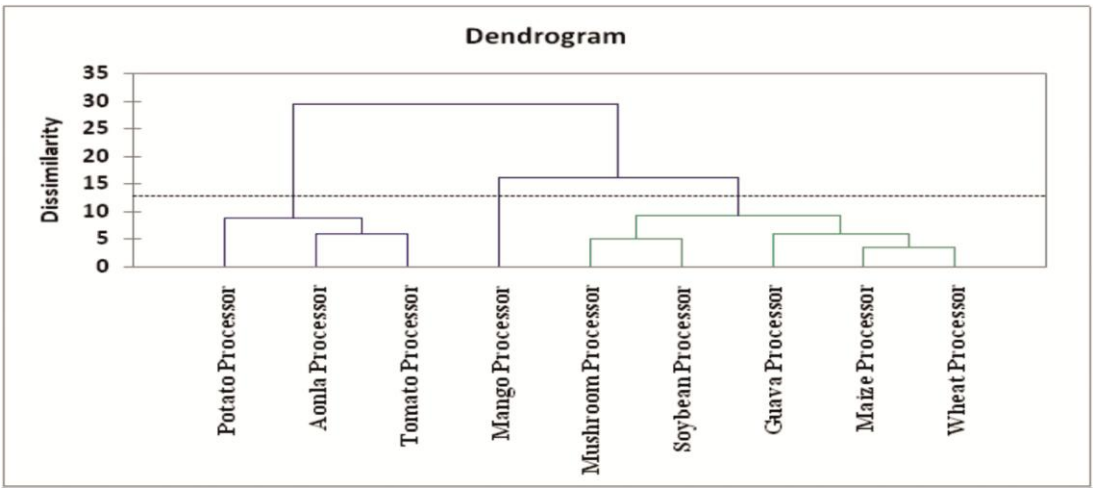

Figure 4.8.1: Dendrogram representing different type of processors into cluster based on market dimension of training need

4.8.2 Clustering of different types of processors according to technical dimension of training need

Table 4.8.2: Representation of the obtained clusters according to technical dimension of training need

Class	**Cluster 1**	**Cluster 2**	**Cluster 3**
Objects	6	2	1
Sum of weights	6	2	1
Within-class variance	1192.26	822.00	0.000
Minimum distance to centroid	17.01	20.27	0.000
Average distance to centroid	30.39	20.27	0.000
Maximum distance to centroid	41.13	20.27	0.000
	Aonla Processor Mango Processor Mushroom Processor Maize Processor Wheat Processor Soybean Processor	Guava Processor Tomato Processor	Potato Processor

Table 4.8.2 and figure 4.8.2 show that in case of technical dimension of training need, six processors formed the cluster 1, due to similar training requirement for determining innovative products or services in value chain development, developing networking skill and effective financial planning. In cluster 2, guava and tomato processors required same types of training for knowing various quality and

safety standards, registration of enterprise and sources, rule, procedures of credit availability. The final cluster included potato processor due to their desire for determining sources, price trends, demand and supply of potato as raw material because of lack of availability and irregularity of suitable potato variety in the study area.

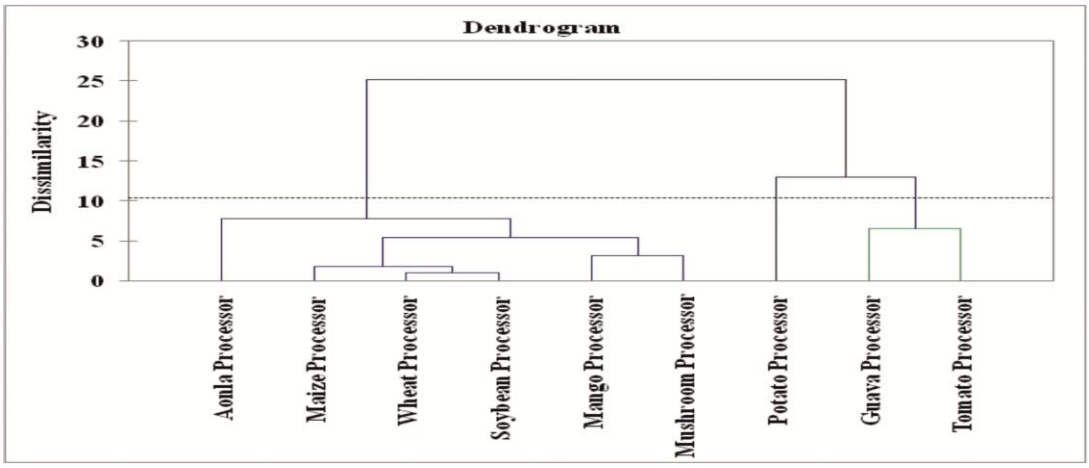

Figure 4.8.2: Dendrogram representing different type of processors into cluster based for technical dimension of training need

4.8.3 Clustering of different types of processors according to information dimension of training need

Table 4.8.3: Representation of the obtained clusters within information dimension of training need

Class	Cluster 1	Cluster 2	Cluster 3
Objects	1	6	2
Sum of weights	1	6	2
Within-class variance	0.000	653.40	179.50
Minimum distance to centroid	0.000	13.71	9.47
Average distance to centroid	0.000	22.47	9.44
Maximum distance to centroid	0.000	31.29	9.47
	Aonla Processor	Guava Processor Mango Processor Mushroom Processor Maize Processor Wheat Processor Soybean Processor	Tomato Processor Potato Processor

In case of information as a dimension of training need, *Aonla* processors form cluster 1 due to their special information requirement on post-harvest management as indicated in table 4.8.3 and figure 4.8.3. However, in cluster 2 six processors were included namely; Guava, Mango, Mushroom, Maize, Wheat and Soybean processors, so this group of processors required similar training like information and support for enterprise expansion and diversification as well as information on how to search and utilize data from patents or other authorised sources. Third cluster (tomato and potato processor) required market information like prices and flow of products.

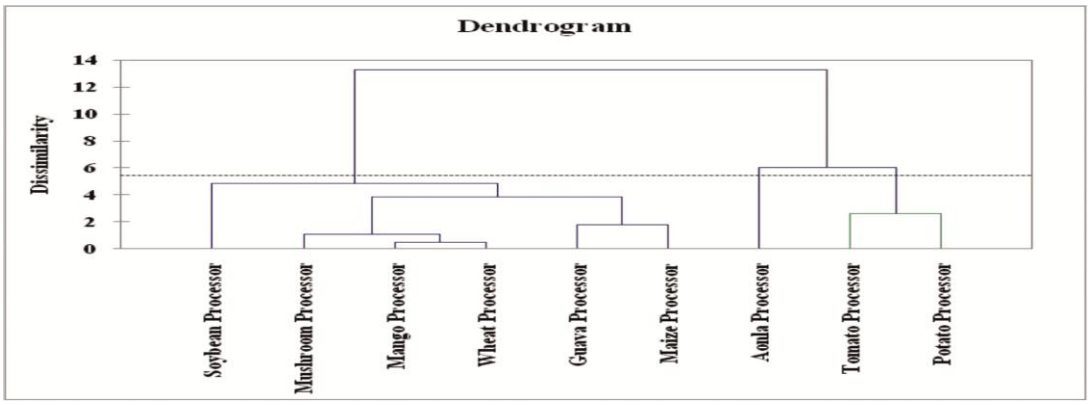

Figure 4.8.3: Dendrogram representing different type of processors into cluster based on information dimension of training need

4.8.4 Clustering of different types of processors according to social responsibility dimension of training need

Table 4.8.4: Representation of the obtained clusters in social responsibility dimension of training need

Class	**Cluster 1**	**Cluster 2**	**Cluster 3**
Objects	5	3	1
Sum of weights	5	3	1
Within-class variance	380.80	269.00	0.00
Minimum distance to centroid	9.93	11.87	0.00
Average distance to centroid	16.68	13.29	0.00
Maximum distance to centroid	23.24	15.51	0.00
	Aonla Processor Guava Processor Tomato Processor Potato Processor Soybean Processor	Mango Processor Mushroom Processor Wheat Processor	Maize Processor

Table 4.8.4 and Figure 4.8.4 shows that *aonla*, guava, tomato, potato and soybean processor form cluster 1, hence they required similar training for effective

utilization of funds and resources. Moreover, Mango, Mushroom and Wheat processors form cluster 2 due to their training need for reducing deleterious effect of processed products on human health and finally maize processor formed the final cluster due to their training need for providing conducive working environment for work culture.

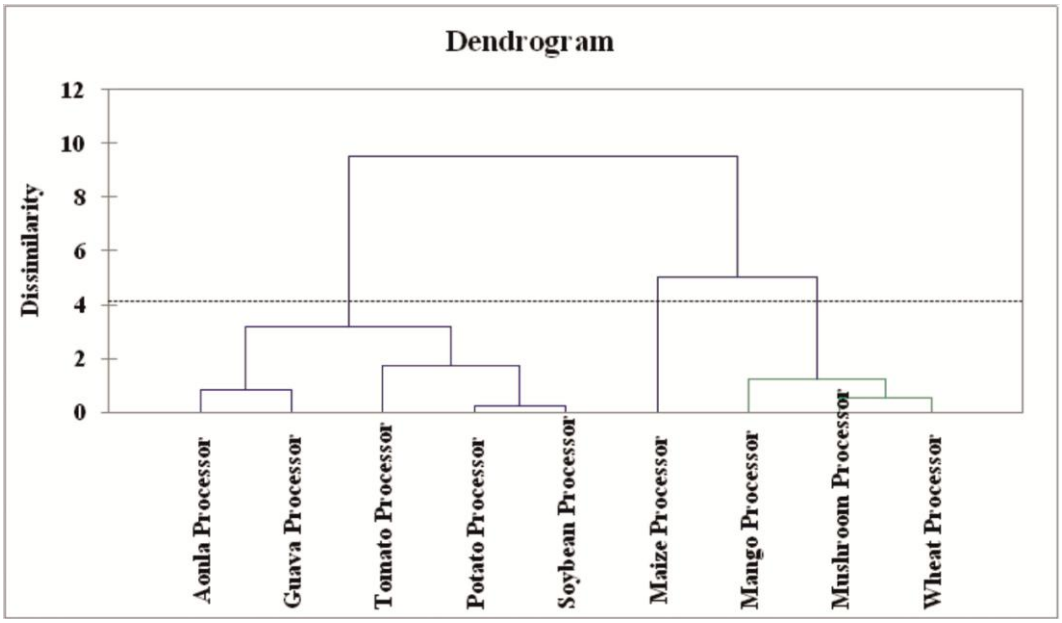

Figure 4.8.4: Dendrogram representing different type of processors into cluster based on social responsibility dimension of training need

4.8.5 Clustering of different types of processors according to overall training need

Table 4.8.5: Representation of the obtained clusters for overall training need

Class	**Cluster 1**	**Cluster 2**	**Cluster 3**
Objects	1	4	4
Sum of weights	1	4	4
Within-class variance	0.000	1780.41	2192.33
Minimum distance to centroid	0.000	30.87	24.38
Average distance to centroid	0.000	36.33	39.52
Maximum distance to centroid	0.000	40.62	46.93
	Aonla Processor	Guava Processor Mango Processor Tomato Processor Potato Processor	Mushroom Processor Maize Processor Wheat Processor Soybean Processor

Table 4.8.5 and figure 4.8.5 indicates that guava, mango, tomato and potato processors form cluster 2. This group of processors required similar types of training as these processors were having comparatively less favourable supporting entrepreneurial environment and they obtained highest scores for training need. The third cluster included the following processors i.e. Mushroom processor, Maize processor, Wheat processor and Soybean processor, which were having similar training need due to favourable supporting entrepreneurial environment and they obtained lower training need scores compared to cluster 2. Only *aonla* processor falls in cluster I, which might be due to much favourable and promoting entrepreneurial environment for *aonla* processor at Pratapgarh.

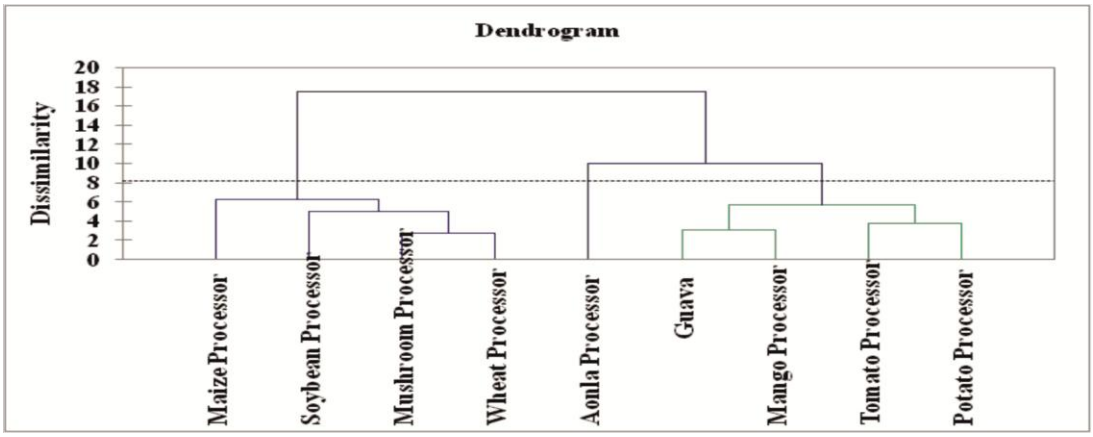

Figure 4.8.5: Dendrogram representing different type of processors into cluster based on overall training need

4.8.6 Overall training need scores among processors

Table 4.8.6: Representation of overall training need scores among processors

Processors	Obtained Training Score	Rank
Aonla	2035	VII
Guava	2217	III
Mango	2108	IV
Tomato	2264	II
Potato	2272	I
Mushroom	2106	V
Maize	2105	VI
Wheat	2001	VIII
Soybean	1953	IX

The maximum score for training need was obtained by potato processors (2272) followed by tomato processors (2264) due to less favourable entrepreneurial environment as indicated in table 4.8.6. The minimum score for training need was obtained by soybean processors (1953), followed by wheat processors (2001) and *aonla* processors (2035).

4.9 To identify the driving forces and restraining forces for upgrading value chain development among processors

To identify the driving forces and restraining forces for upgrading Value Chain Development (VCD) among different types of processors, Kurt Lewins' Force Field Analysis was used. The data was collected from 15 respondents in each agricultural commodity on five point continuum i.e. 5- most important, 4- very important, 3- important, 2-less important, 1- not important. The driving and restraining forces for processors include six dimensions TIMFLS (T- Technical Forces, I- Infrastructure Forces, M-Market Forces, F-Financial Forces, L- Legal Forces and S- Socio-Personal Forces).

4.9.1 To identify the driving and restraining forces in case of Indian gooseberry (*Aonla*) processors through force field analysis

Hypothesis 1

Ho: There was no significant difference in driving forces and restraining forces of *aonla* processor

H1: There was significant difference between driving and restraining forces of *aonla* processor

Table 4.9.1: Representation of driving forces (DF) and restraining forces (RF) for *aonla* processors

Respondent	Cases	N	Mean rank	Z
Aonla Processor	DF>RF	30	15.50	-4.783 (p<0.001)
	RF>DF	0	0	
	DF=RF	0	0	

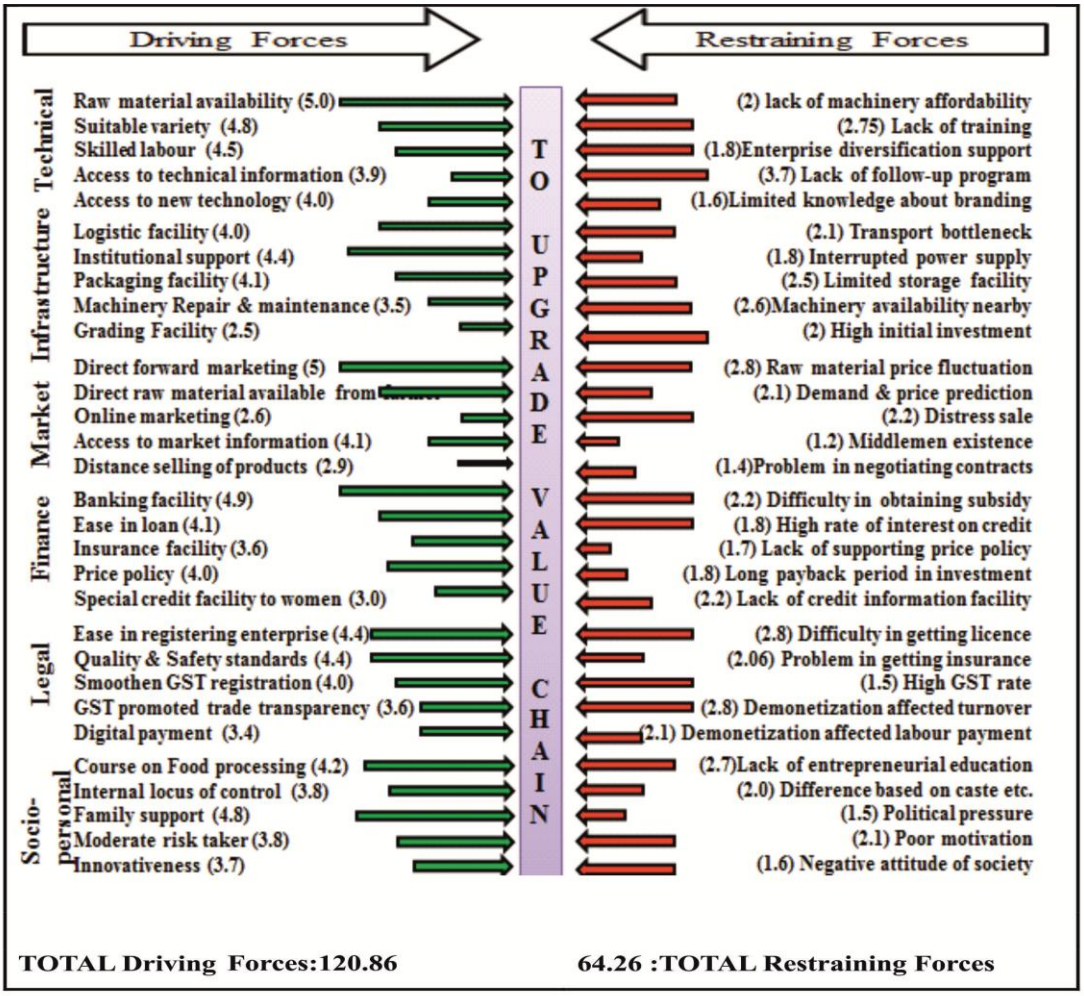

Figure 4.9.1: Force Field Analysis to identify driving and restraining forces for VCD of *Aonla* processor

Figure 4.9.1 and table 4.9.1 indicates that in case of *aonla* processors, there was significant (Z=-4.78, p<0.001) difference between driving and restraining forces for *aonla* processor, thus, null hypothesis was rejected. Therefore, it can be inferred that driving forces score (120.86) was higher compared to restraining forces score (64.26) which indicates that entrepreneurial environment was quite promoting to upgrade value chain at Pratapgarh in Uttar Pradesh for *aonla* processing. The factors responsible for more driving forces were timely and regular availability of *aonla* (5), suitable variety (4.8), direct marketing of processed products (5), direct contact between processor and producers (4.8), credit facility (4.9), awareness of quality and safety standards (4.4). However, the major factors responsible for restraining forces were lack of training nearby (2.75) and its follow up (3.7), lack of entrepreneurial

education (2.7), difficulty in obtaining subsidy (2.2), difficulty in getting license (2.8) etc.

4.9.2 To identify the driving and restraining forces in case Guava processors through force field analysis

Hypothesis 2

Ho: The driving forces was lower compared to restraining forces for guava processor

H1: The driving forces was higher compared to restraining forces for guava processor

Table 4.9.2: Representation of driving and restraining forces for guava processors as per Wilcoxon sign test

Respondent	Cases	N	Mean rank	Z
Guava Processor	DF>RF	27	16.76	-4.52 (p<0.001)
	RF>DF	3	6.33	
	DF=RF	0	0	

A closer look on Figure no 4.9.2 and Table 4.9.2 indicate that driving forces (111.4) were significantly higher than restraining forces (71.53) at probability .001 (Z=-4.52) in case of guava processors, thus, alternate hypothesis was accepted. The driving factors for upgrading value chain were easily and locally availability of guava (5), suitable variety of guava (4.7), access to training and courses on food processing (4.2), GST promoted trade transparency (4) etc. Whereas, the restraining factors for up gradation of value chain were lack of follow up training (4.1), lack of enterprise diversification support (4), high GST rate (2.6), and demonetization affected turnover (4.1).

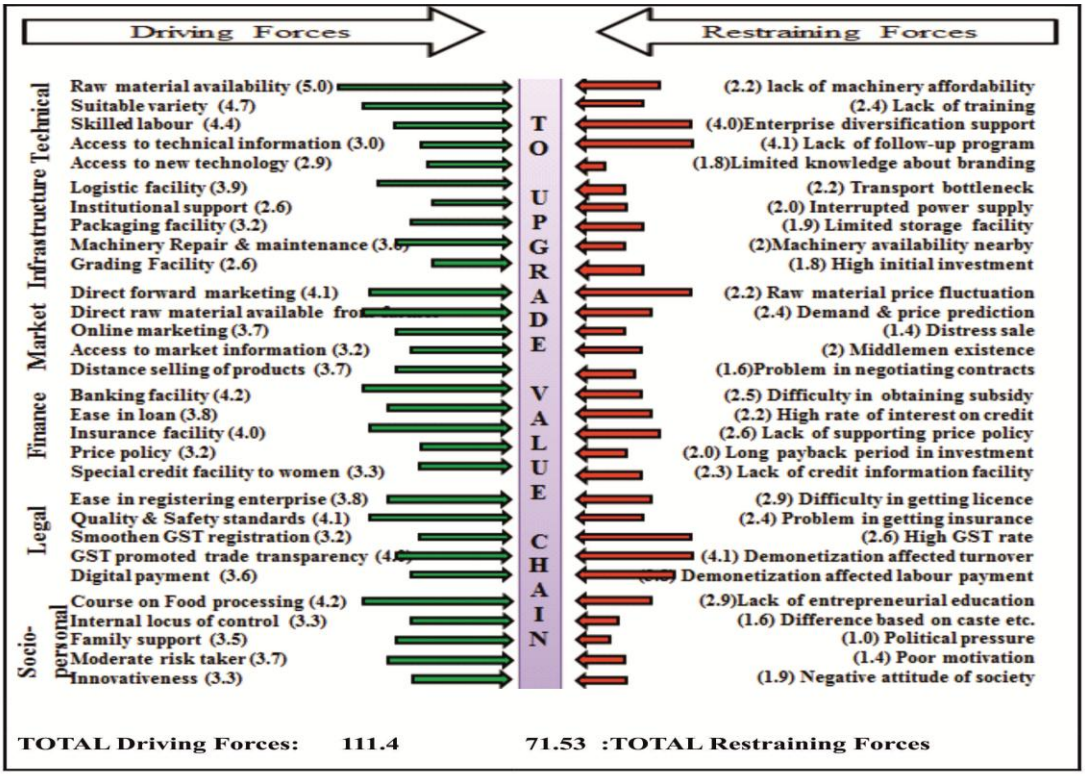

Figure 4.9.2: Force field analysis to identify the driving and restraining forces in case Guava processors to upgrade VCD

4.9.3 To identify the driving and restraining forces in case Mango processors through force field analysis

Hypothesis 3

Ho: The driving forces were lower compared to restraining forces for mango processor

H1: The driving forces were higher compared to restraining forces for mango processor

Table 4.9.3: Representation of driving and restraining forces for mango processors as per Wilcoxon sign test

Respondent	Cases	N	Mean rank	Z
Guava Processor	DF>RF	24	17.7	-4.004 (p<0.001)
	RF>DF	6	6.33	
	DF=RF	0	0	

Figure 4.9.3 and Table 4.9.3 indicate that driving forces (108.54) were significantly higher compared to restraining forces (66.06) for upgrading value chain in case of mango processors (pickles processor) at probability.001(Z= -4.004). The

major factors responsible for driving forces were timely availability of raw mango (4.8), suitable variety (4.6), institutional support (4.2), direct marketing of processed product (4.8), direct contact with producers for raw mangoes (4.6), online marketing (4), digital payment (4.2) etc. However, the forces restraining the up gradation of value chain were demonetization affected labour payment (4.2), demonetization affected turnover (4), difficulty in obtaining subsidy (2.75), licence (3.5), high GST rate (2.2) and lack of enterprise diversification support (4.2).

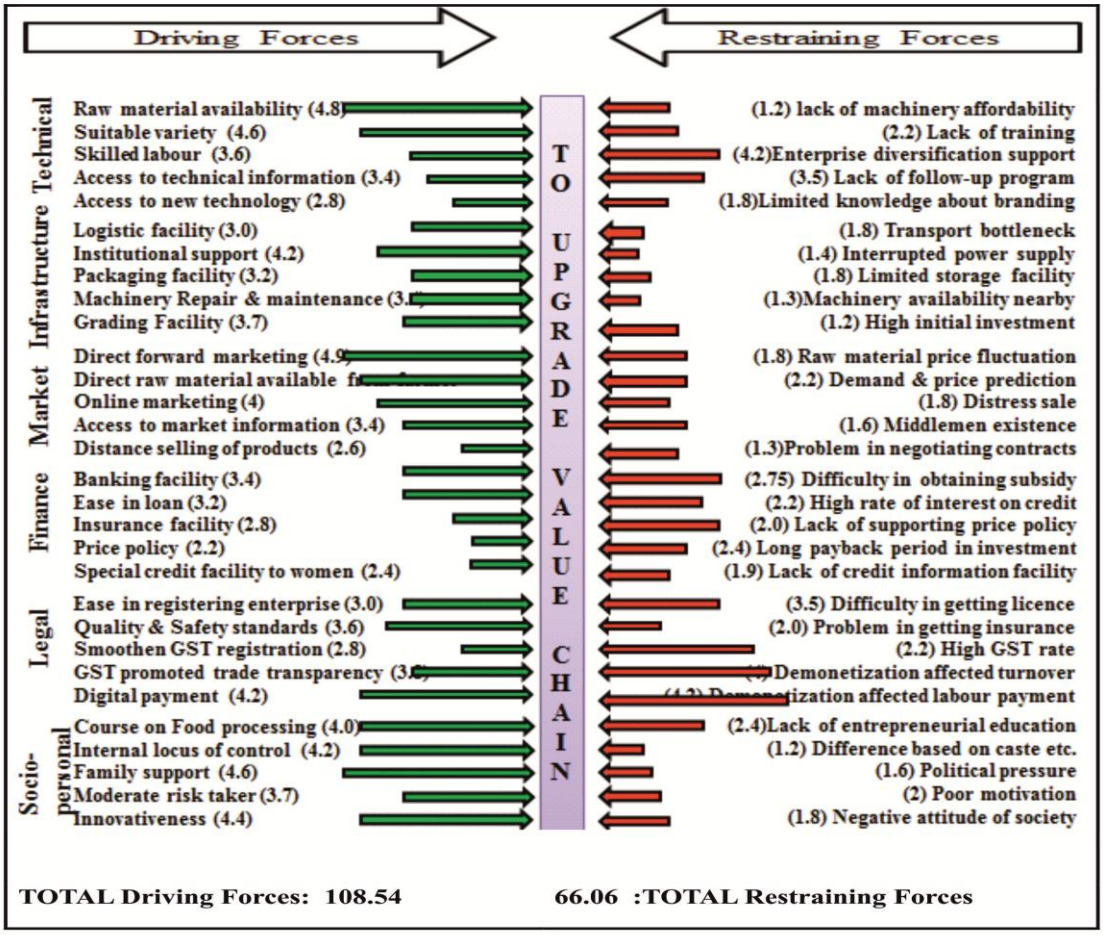

Figure 4.9.3: Force field analysis to identify the driving and restraining forces in case Mango processors to upgrade VCD

4.9.4 The major dimensions responsible for driving and retraining forces among fruit processors

Table 4.9.4: The major dimensions responsible for driving and retraining forces among fruit processors based on Friedman Analysis

S		*Aonla* (n=15)		Guava (n=15)		Mango (n=15)	
A	**Driving Forces**	**Mean of rank*** **	**Group**	**Mean of rank** ** X^2 10.85(5)	**Group**	**Mean of rank*** ** X^2 39.22	**Group**

		X^2 19.43 (5)				(5)	
1	Technical	5.00	A	4.43	A	4.40	A
2	Infrastructure	2.33	B	2.43	B	3.46	A B
3	Market	2.93	B	3.73	A B	4.26	A B
4	Financial	3.30	A B	3.20	A B	1.46	C
5	Legal	3.40	A B	3.30	A B	2.43	B C
6	Socio-psychological	4.03	A B	3.90	A B	4.96	A
B	**Resisting Forces**	**Mean of rank*** ** X^2 11.07 (5)	**Group**	**Mean of rank*** ** X^2 43.18 (5)	**Group**	**Mean of rank*** ** X^2 48.69 (5)	**Group**
1	Technical	2.83	A B	4.833	A	4.56	A B
2	Infrastructure	4.13	A B C	2.60	B C	1.66	C
3	Market	3.03	C	2.46	B C	2.50	C
4	Financial	3.40	B C	3.86	B	3.83	A B C
5	Legal	4.36	A	5.33	A	5.67	A
6	Socio-personal	3.23	C	1.90	C	2.76	B C

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

Table 4.9.4 indicates that among *aonla* processors, technical dimension (5) was found to be more important for driving forces due to timely availability of raw material, suitable variety, access to technical information, labour availability etc. whereas legal dimension (5.1) was found to be more responsible for restraining forces because of difficulty in getting licence, high GST rate, effect of demonetization on turnover and labour payment. Similar observation were found in case of Guava processors. However, for mango processor, socio-personal factor (4.96) was contributing more to driving forces due to family support and involvement in value addition, availed courses on food processing and high internal locus of control. Again, the legal dimension (5.67) was more responsible for restraining forces due to effect of demonetization on labour payment (4.2) and turnover (4).

4.9.5 To identify the driving and restraining forces in case of tomato processors through force field analysis

Hypothesis 4

Ho: There was no significant difference in driving forces and restraining forces of tomato processor

H1: There was significant difference between driving and restraining forces of tomato processor

Table 4.9.5: Representation of driving and restraining forces for tomato processors as per Wilcoxon sign test

Respondent	Cases	N	Mean rank	Z
Tomato Processor	DF>RF	27	16.06	-4.136 (p<0.001)
	RF>DF	3	10.50	
	DF=RF	0	0	

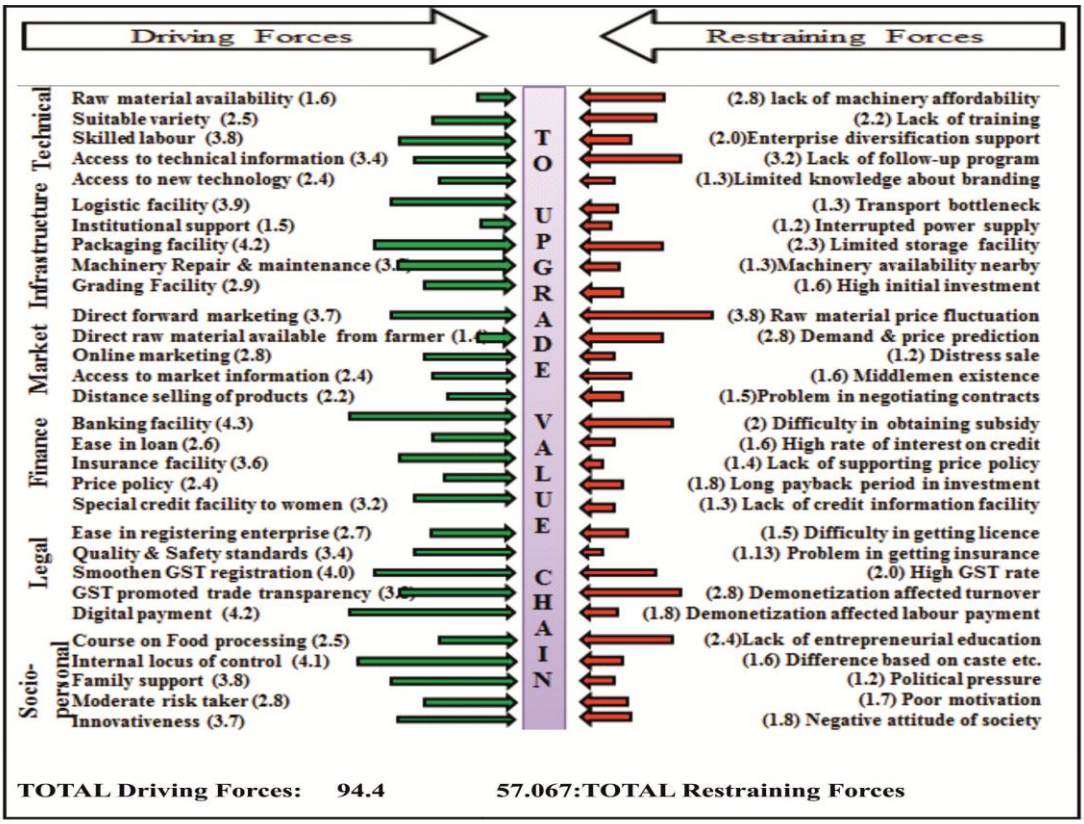

Figure 4.9.4: Force field analysis to identify the driving and restraining forces in case of tomato processors

Figure 4.9.4 and Table 4.9.5 indicate that there was significant difference for driving and restraining forces as per Wilcoxon test (Z=-4.136; p<0.001), thus, alternate hypothesis was accepted. Therefore, it can be inferred that for upgrading value chain, driving forces (94.4) were higher compared to restraining forces (57.06)

among tomato processors at Dhar district of Madhya Pradesh. However, compared to fruit processor (*aonla*, guava and mango), the score of driving forces in case of tomato processor was found to be low because of irregular availability of raw tomato (1.6), lack of direct contract of processor with producers (1.4) and low institutional support (1.5). The factors mainly responsible for driving forces were banking facility (4), smooth registering of GST compared to earlier tax (4), digital payment (4.2), GST promoted trade transparency (3.8) etc. The factors mainly responsible for restraining forces were high price fluctuation of tomato (3.8), machinery cost (2.8) etc.

4.9.6 To identify the driving and restraining forces in case of potato processors through force field analysis

Hypothesis 5

Ho: There was no significant difference in driving forces and restraining forces of potato processor

H1: There was significant difference between driving and restraining forces of potato processor

Table 4.9.6: Representation of driving and restraining forces for potato processors as per Wilcoxon sign test

Respondent	Cases	N	Mean rank	Z
Potato Processor	DF>RF	23	13.96	-3.686 (p<0.001)
	RF>DF	3	10	
	DF=RF	4	0	

Figure 4.9.5 and Table 4.9.6 indicate there was significant difference (Z= -3.686) between driving and restraining forces of potato processor, thus, null hypothesis was rejected. It can be inferred that driving forces (89.18) were higher in comparison to restraining forces (57.93) in case of potato processor to upgrade value chain. The factors responsible for higher driving forces were direct marketing facility (4.3), family support and involvement in processing (4.8) and for restraining forces were high price fluctuation (3.8), lack of training (3.1), lack of follow up program (2.8), high GST rate (2.5), demonetization affected turnover (2.6) etc. Compared to fruit processor, the potato processors were having low driving forces

due to high cost and irregular availability of potato (2.1), difficulty in getting suitable variety of potato (1.5), low institutional support (2). However, the low restraining forces were observed due to low initial investment (1), less problem in negotiating contacts (1.3), nearby availability of machinery (1.4), transport bottleneck (1) etc.

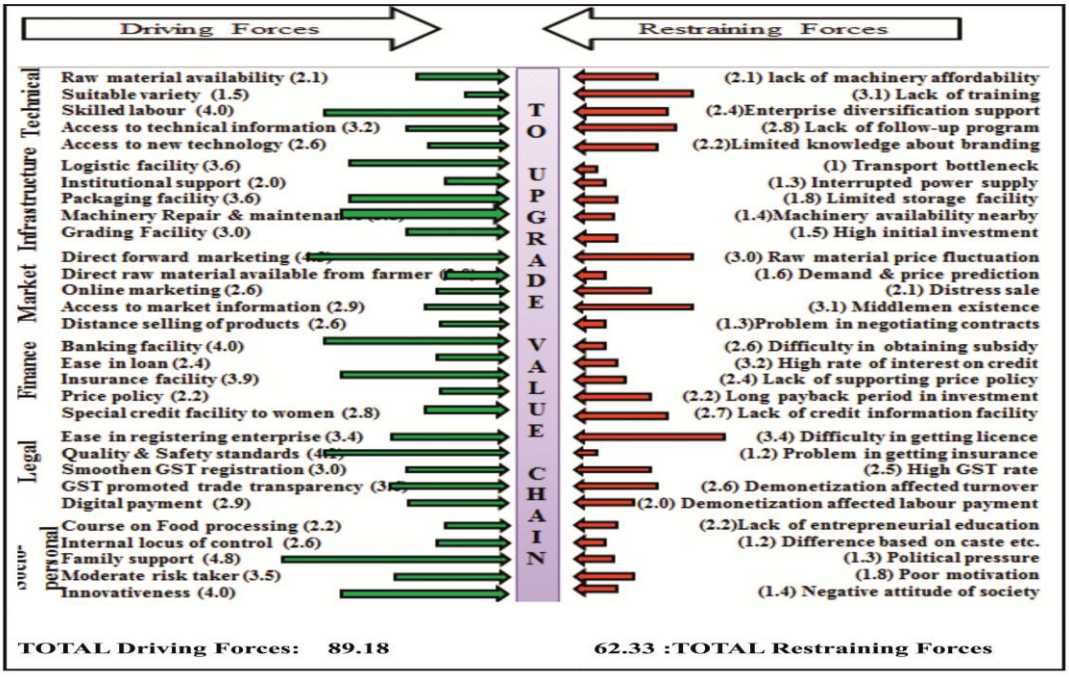

Figure 4.9.5: Force field analysis to identify the driving and restraining forces in case of potato processors

4.9.7 To identify the driving and restraining forces in case of mushroom processors through force field analysis

Hypothesis 6

Ho: The mushroom processors were having less driving forces than restraining forces

H1: The mushroom processors were having more driving forces than restraining forces

Table 4.9.7: Representation of driving and restraining forces for mushroom processors as per Wilcoxon sign test

Respondent	Cases	N	Mean rank	Z
Mushroom Processor	DF>RF	30	15.50	-4.78 (p<0.001)
	RF>DF	6	0	
	DF=RF	0	0	

Figure 4.9.6 and Table 4.9.7 indicate that the driving forces were significantly higher (Z;p<0.001) than restraining forces. So, alternate hypothesis was accepted. It was observed that the difference between driving and restraining forces was much higher compared to other vegetable (tomato & potato) processors. It indicates that entrepreneurial environment for value addition of mushroom was favourable at sonepat, Haryana. The major factors responsible for driving forces were timely and reasonable availability of raw material (5), suitable variety availability (4.7), access to technical information (3.8), direct contact with producers (4.7), availability of training and courses from HAIC (4.4), Institutional support (5) etc. The major factors responsible for restraining forces were high machinery cost (3.5), initial investment (2.8), difficulty in predicting demand and prices of processed product (3.4) etc.

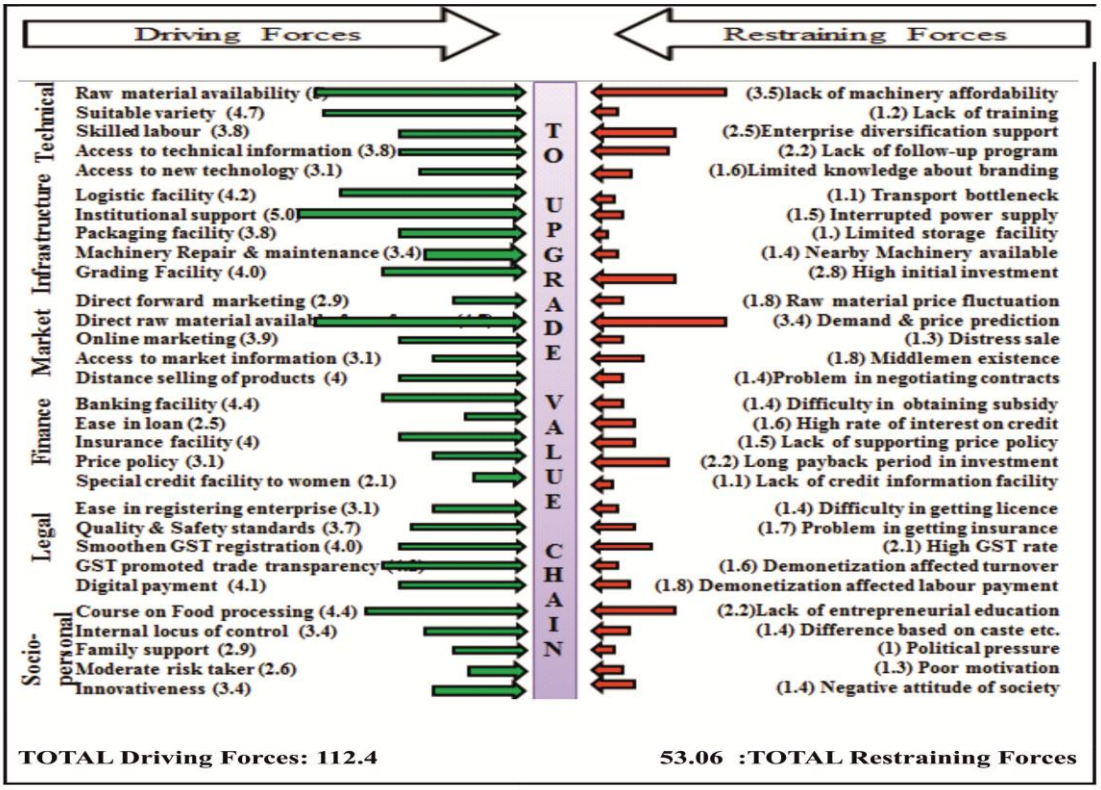

Figure 4.9.6: Force field analysis to identify the driving and restraining forces in case of mushroom processors

4.9.8 The major dimensions responsible for driving and restraining forces among vegetable processors

Table 4.9.8: The major dimensions responsible for driving and retraining forces among vegetable processors based on Friedman Analysis

S		Tomato (n=15)		Potato (n=15)		Mushroom (n=15)	
A	**Driving Forces**	**Mean of rank*** X^2 41.41 (5)**	**Group**	**Mean of rank*** X^2 33.48 (5)**	**Group**	**Mean of rank*** X^2 43.47 (5)**	**Group**
1	Technical	2.23	B C	2.56	B C	5.00	A
2	Infrastructure	3.80	A B	4.60	A	4.96	A
3	Market	1.53	C	3.26	A B C	3.16	A B C
4	Financial	3.93	A B	3.90	A B	1.70	C
5	Legal	5.16	A	1.73	C	3.93	A B
6	Socio-psychological	4.33	A	4.93	A	2.23	B C
B	**Resisting Forces**	**Mean of rank*** X^2 39.27 (5)**	**Group**	**Mean of rank*** X^2 37.13 (5)**	**Group**	**Mean of rank*** X^2 34.20 (5)**	**Group**
1	Technical	5.46	A	4.23	A	2.83	B C
2	Infrastructure	2.10	C	1.7	C	5.43	A
3	Market	4.66	A B	4.1	A B	4.40	A B
4	Financial	2.40	C	5.06	A	2.66	B C
5	Legal	3.40	B C	3.66	A B	3.53	A B C
6	Socio-psychological	2.96	B C	2.20	B C	2.13	C

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

Table 4.9.8 indicates that in case of tomato processor, legal dimension (5.16) was found to be contributing more for driving forces due to smooth in registering process or GST compared to earlier taxes. The processors were of the opinion that

GST promoted more transparency in trade, digital payment and awareness about food quality and safety standards. Among restraining forces, technical dimension (5.46) shared more due to irregular and unreasonable availability of tomatoes in Indore. In case of potato processor, socio-personal factor (4.93) contributed more for driving forces probably due to involvement of family members in processing (chips, namkeen, papad making) . For potato processor in Meerut, financial dimension (5.06) followed by technical dimension (4.23) contributed more to the restraining forces probably due to difficulty in obtaining subsidy, high interest rate, long payback period, problem of irregular and unreasonable prices of potato, and unsuitability of local varieties of potato for processing. In case of mushroom processor, technical dimension (5.0) contributed more to driving forces due to availability of mushroom locally at reasonable rate, easy availability of suitable varieties and access to information available. For restraining forces, infrastructure dimension (5.4) contributed more due to high initial investment and high machinery cost.

4.9.9 To identify the driving and restraining forces in case of maize processors through force field analysis

Hypothesis 7

Ho: There was no significant difference in driving forces and restraining forces of maize processor

H1: There was significant difference between driving and restraining forces of maize processor

Table 4.9.9: Representation of driving and restraining forces for maize processors as per Wilcoxon sign test

Respondent	Cases	N	Mean rank	Z
Guava Processor	DF>RF	29	15.50	-4.7046 (p<0.001)
	RF>DF	0	0	
	DF=RF	1	0	

Figure 4.9.7 and Table 4.9.9 indicate that there was significant difference (Z= -4.70; p<0.001) between driving and restraining forces, so null hypothesis was rejected. It can be inferred that driving forces (105.93) were fairly high compared to

restraining forces (56.6) in case of maize processor. In driving forces, major factors contributing were reasonable and local availability of maize (5), availability of suitable processing variety (4.8), institutional support (4) etc. and for restraining forces, major contributing factors were lacking enterprise diversification support (3.5), lack of training (2.7), lack of follow up program (3.6), interrupted power supply (2.6) etc.

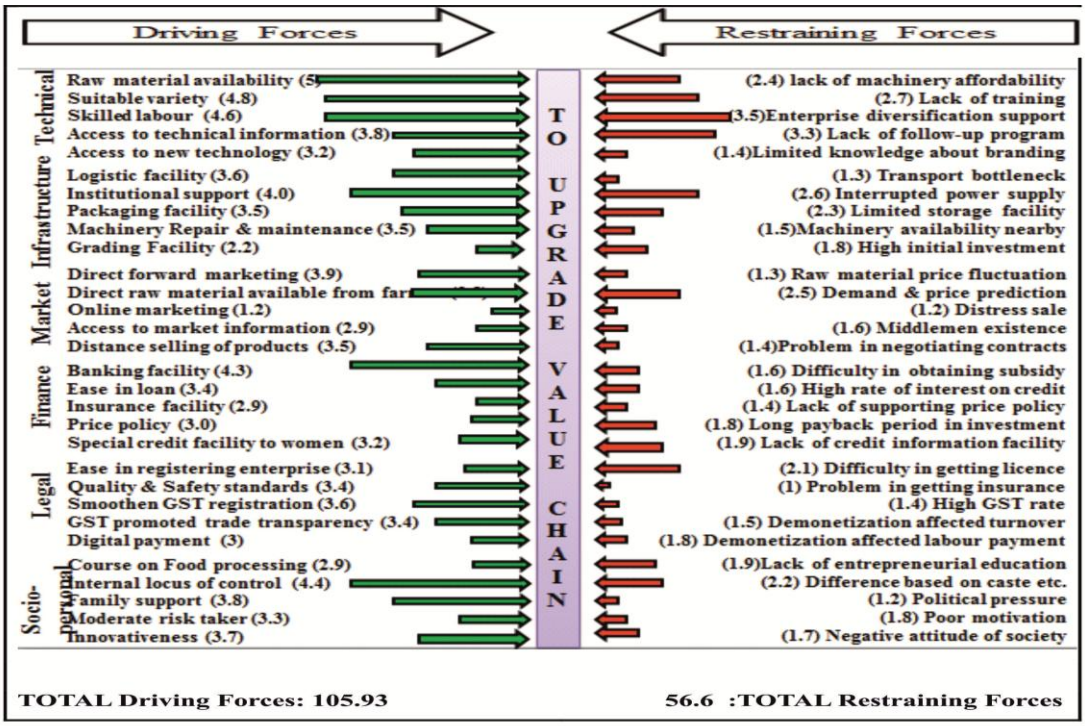

Figure 4.9.7: Force field analysis to identify the driving and restraining forces in case of maize processors

4.9.10 To identify the driving and restraining forces in case of wheat processors through force field analysis

Hypothesis 4

Ho: There was no significant difference in driving forces and restraining forces of wheat processor

H1: There was significant difference between driving and restraining forces of wheat processor

Table 4.9.10: Representation of driving and restraining forces for wheat processors as per Wilcoxon sign test

Respondent	Cases	N	Mean rank	Z
Wheat Processor	DF>RF	29	15.0	-4.785 (p<0.001)
	RF>DF	0	0	
	DF=RF	1	0	

Figure 4.9.8 and Table 4.9.10 indicate that driving forces (108.6) were significantly higher than retraining forces (49.12) in case of wheat processor for upgrading value chain at probability.001 (Z= -4.785; p<0.001). The major factors responsible for driving forces were affordability and timely availability of wheat (4.4), easily and locally availability of suitable variety (3.6), institutional support (4), online marketing (4.4), digital payment (4.4) etc. Whereas, the factors responsible for restraining forces were middleman existence (2.8), high GST rate (2.3), problem in negotiating contracts (2.1), difficulty in getting subsidy (2.1) etc.

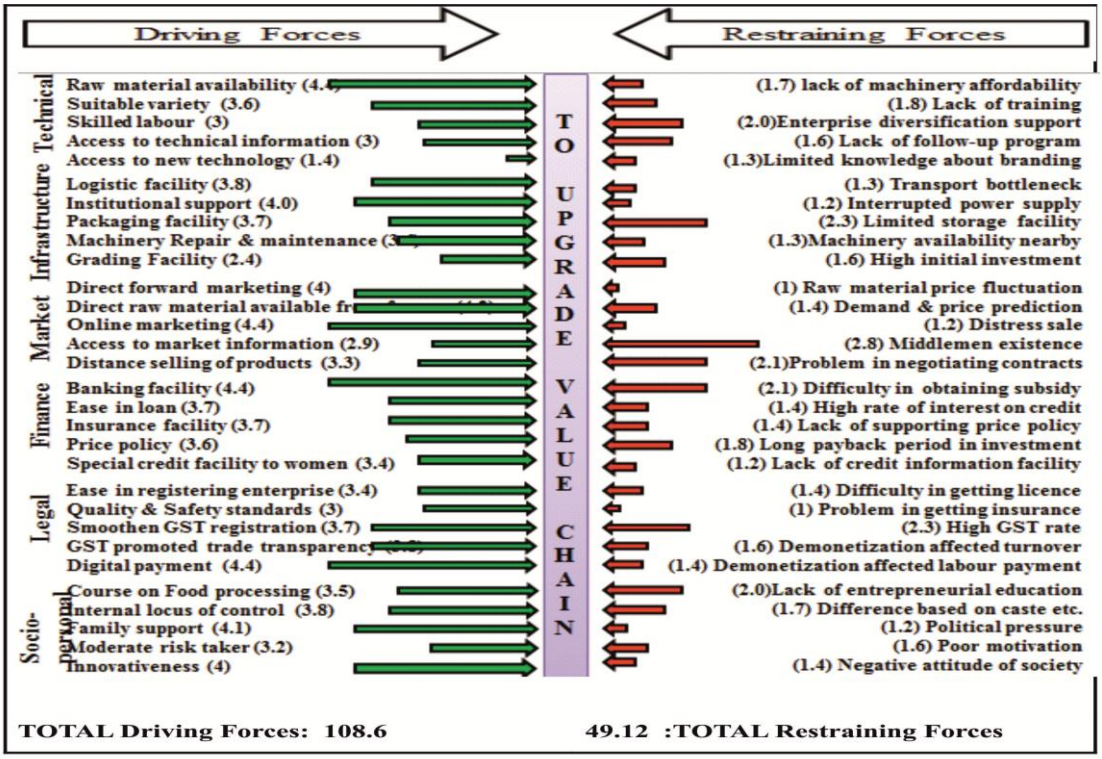

Figure 4.9.8: Force field analysis to identify the driving and restraining forces in case of wheat processors

4.9.11 To identify the driving and restraining forces in case of soybean processors through force field analysis

Hypothesis 9

Ho: There was no significant difference in driving forces and restraining forces of soybean processor

H1: There was significant difference between driving and restraining forces of soybean processor

Table 4.9.11: Representation of driving and restraining forces for soybean processors as per Wilcoxon sign test

Respondent	Cases	N	Mean rank	Z
Soybean Processor	DF>RF	29	15	-4.708 (p<0.001)
	RF>DF	0	0	
	DF=RF	1	0	

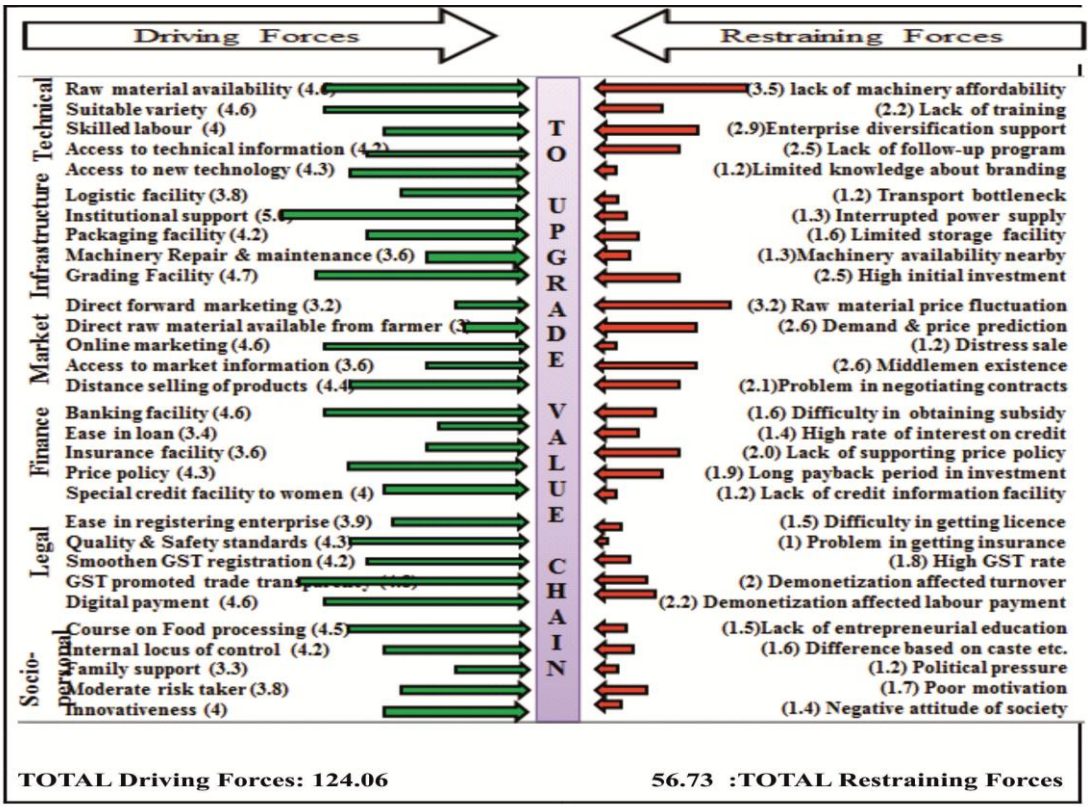

Figure 4.9.9: Force field analysis to identify the driving and restraining forces in case of soybean processors

Figure 4.9.9 and Table 4.9.11 indicate that driving force (124.06) was found to be significantly higher than restraining forces (56.73) as compared to other types of processors at test statistic Z=-4.708; p<0.001. In driving forces, the major factors responsible were institutional support (5), timely availability of soybean (4.6), suitability of variety (4.6), grading facility (4.7), online marketing (4.6) etc. However, the major factor responsible for restraining forces were lack of enterprise diversification support (3.5), lack of follow up program (3.3), difficulty in predicting demand and price fluctuation (2.5), high cost of machinery (2.4) etc.

4.9.12 The major dimensions responsible for driving and retraining forces among food grain processors

Table 4.9.12: The major dimensions responsible for driving and retraining forces among food grain processors based on Friedman Analysis

S		Maize (n=15)		Wheat (n=15)		Soybean (n=15)	
A	**Driving Forces**	**Mean of rank*** ** X^2 38.29 (5)	**Group**	**Mean of rank*** ** X^2 35.34 (5)	**Group**	**Mean of rank*** ** X^2 43.24 (5)	**Group**
1	Technical	5.93	A	1.10	B	5.43	A
2	Infrastructure	2.93	B	3.13	A	4.33	A B
3	Market	2.13	B	4.40	A	1.83	C
4	Financial	3.00	B	4.30	A	2.46	B C
5	Legal	3.13	B	3.93	A	4.23	A B
6	Socio-psychological	3.86	B	4.13	A	2.70	B C
B	**Resisting Forces**	**Mean of rank*** ** X^2 61.93 (5)	**Group**	**Mean of rank^NS** ** X^2 2.9 (5)	**Group**	**Mean of rank*** ** X^2 49.07 (5)	**Group**
1	Technical	6.00	A	3.83	A	5.23	A
2	Infrastructure	4.40	A B	3.23	A	2.70	B
3	Market	1.00	C	3.73	A	5.50	A
4	Financial	3.23	B	3.46	A	2.70	B
5	Legal	2.76	B C	3.03	A	3.00	B

6	Socio-psychological	3.60	B	3.66	A	2.16	B

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

Table 4.9.12 indicates that in case of maize processor, technical dimension (5.93) contributed more for driving forces due to easy access and affordability of suitable maize variety. Also, technical dimension (6) contributed more to restraining forces due to lack of training and enterprise diversification support. In case of Wheat processor, market dimension (4.4) contributed more to driving forces due to online market facility, direct as well as distance marketing of processed product, direct contact with producers for input and access to market information. However, restraining forces were found to be non-significant. In case of soybean, technical dimension (5.4) was found to be major driving forces due to timely availability of suitable variety of soybean, access to information and new technology related to value addition of soybean. Market (5.50) contributed more to restraining forces due to fluctuation of prices of soybean, middleman existence and problem in negotiating contacts.

4.9.12 Comparing the driving and restraining forces of average processor and producers

Hypothesis 10 & 11

Ho: Driving forces were lower for average processor compared to average producers

H1: Driving forces were higher for average processor compare to average producers

Ho: Restraining forces were lower for average producers than average processor

H1: Restraining forces were higher for average producers than average processor

Table 4.9.13: Comparison of average producers and average processors for driving forces and restraining forces

Forces	Respondent	Mean rank	Mann-Whitney U	Wilcoxon W	Z
Driving	Processor	39.10	192 (p<0.001)	657	-3.816
	Producers	21.90			

Restraining	Processor	15.67	5	470	-6.584
	Producers	45.33	(p<0.001)		

Table 4.9.13 shows that, for driving forces, processors (39.10) possessed higher mean rank than producers (21.90) and the test statistic of Mann Whitney was significant (U=192; p<0.001). Thus, null hypothesis was rejected and alternate hypothesis was accepted. For restraining forces, producers (45.33) possessed higher mean rank than processors (15.67) and the test statistic of Mann Whitney was significant (U=5; p<0.001). Therefore, alternate hypothesis was accepted. Thus, it can be inferred that driving forces were higher for processor and restraining forces were higher for producers. The reason for the result, entrepreneurial environment was same for processor and producers, but the processors were having more opportunity seeking and risk taking ability so, they took the challenges because of entrepreneurial behaviour. Thus, it is suggested that we should focus on developing entrepreneurial behaviour among producers as well as making the environment conducive for agripreneurship.

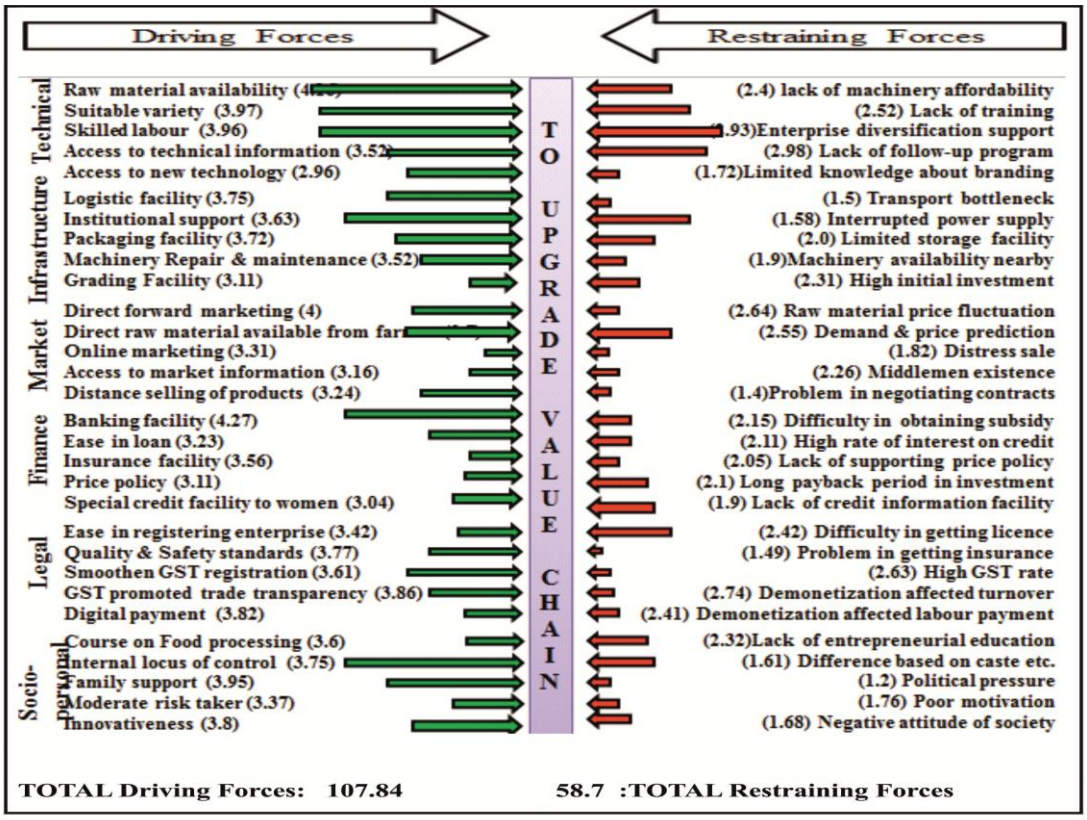

Figure 4.9.10: Force field Analysis showing driving and restraining forces for average processors

The figure 4.9.10 & 4.9.11 clearly indicates that driving forces were found to be significantly higher in case of processors (107.84) as compared to producers (87.4). The probable reason behind this may be that the producers were having low access to institutional support (F=1.4), collective marketing (1.8), food processing courses (F=2.4). However, it was observed that producers were having many opportunities like awareness about package of practices (4), local access to raw material (5), affordability of raw material (4.8), direct contact with processor (3.1) etc. Instead of many opportunities, producers were unable to utilize them effectively due to following restraining forces: lack of awareness of processing technology (4.8), poor support to start up (3.8), lacking exposure visit (4.6), middleman existence (5), lacking economic motivation (5), lacking marketing orientation (3.8), and perceiving processing as cumbersome process (3.2). Hence, it was found that there was significant difference in restraining forces of producers (117) and processors (58.7).

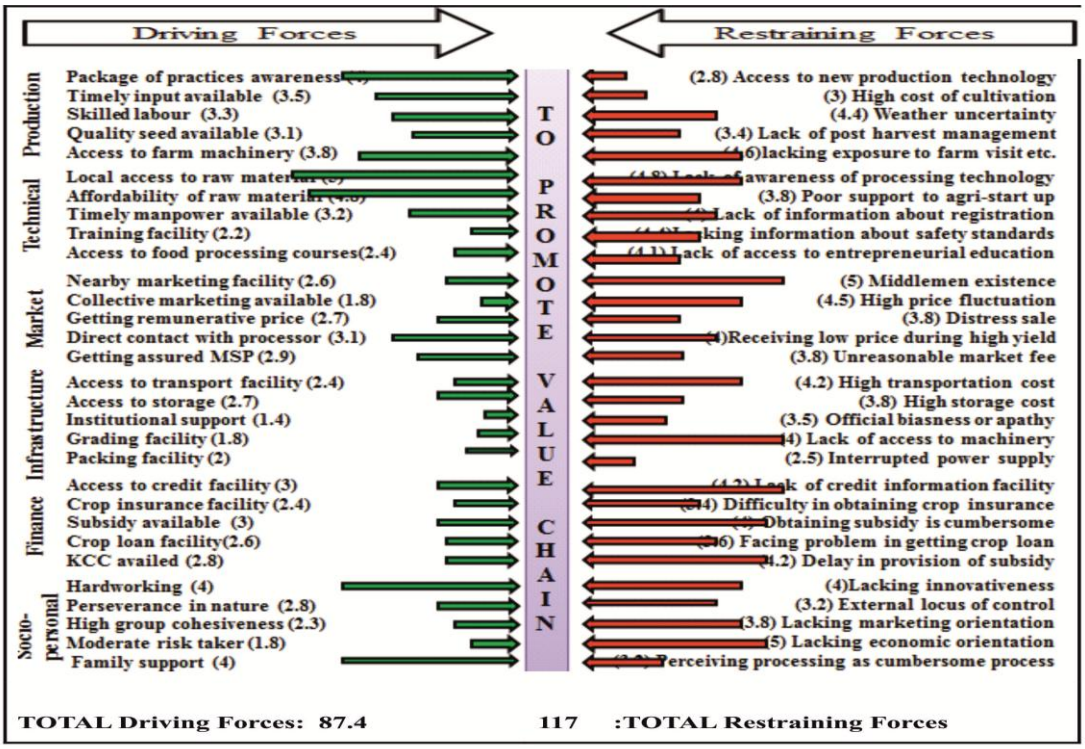

Figure 4.9.11: Force field analysis representing the driving and restraining forces among average producers

4.9.14 Dimension wise ranking of different types of processors for driving and restraining forces

Table 4.9.14: Mean Rank of Technical Dimension by different types of processors for driving and restraining forces as per Kruskal walis

Technical Driving Forces					Technical Restraining Forces					
Processor	Mean Rank*** X^2 110.23	Groups			Processor	Mean Rank*** X^2 70.86	Groups			
Soybean	119.40	A			Guava	113.40	A			
Aonla	105.70	A	B		Maize	94.66	A	B		
Maize	95.93	A	B		Mango	86.20	A	B		
Mushroom	79.86	A	B		Soybean	78.50	A	B	C	
Guava	77.93	A	B		Potato	65.70		B	C	
Mango	63.46		B	C	Tomato	65.10		B	C	
Wheat	27.56			C	*Aonla*	57.26		B	C	D
Tomato	22.73			C	Mushroom	34.33			C	D
Potato	19.40			C	Wheat	16.83				D

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

For technical driving force, mean rank of soybean processor (119.40) was highest followed by *aonla* processor (105.7) and maize processor (95.93) probably due to affordability and timely access to raw material, timely labour availability and access to technical information (table 4.9.14). However, for potato and tomato processor, suitable variety of raw material was not easily available and they were costly as well. For technical restraining forces, guava (113), maize (94.66) and mango processors (86.20) had obtained higher mean rank due to lack of training and its follow up support as well as lack of support for enterprise diversification whereas in case of wheat and mushroom processor training and institutional support was available.

Table 4.9.15: Mean Rank of Infrastructure Dimension by different types of processors for driving and restraining forces as per Kruskal walis

Infrastructure Driving Forces			Infrastructure Restraining Forces		
Processor	**Mean Rank*** X^2 69.38**	**Groups**	**Processor**	**Mean Rank*** X^2 51.47**	**Groups**
Soybean	118.33	A	*Aonla*	110.50	A
Mushroom	107.50	A B	Maize	95.36	A B
Aonla	80.20	A B C	Guava	94.16	A B
Mango	67.20	B C D	Mushroom	58.86	B C
Wheat	63.40	B C D	Soybean	56.46	B C
Guava	53.23	C D	Tomato	55.96	B C
Maize	51.93	C D	Wheat	55.96	B C
Tomato	41.06	C D	Maize	48.06	C
Potato	29.13	D	Potato	36.63	C

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

Table 4.9.15 indicates that for infrastructure driving forces, soybean (118.33), mushroom (107.50) and *aonla* (80.20) processors ranked higher due to access to institutional support whereas tomato (41) and potato (29.13) processors ranked lower due to lack of institutional support. For infrastructure restraining forces, *aonla* (110.50), maize (95.36) and guava (94.16) processors were ranked higher due to inadequate storage facility and high initial investment, however, potato processor (36.63) was ranked last due to low initial investment and storage problem.

Table 4.9.16: Mean rank of Market Dimension by different types of processors for driving and restraining forces as per Kruskal walis

Market Driving Forces			Market Restraining Forces		
Processor	Mean Rank*** X^2 76.90	Groups	Processor	Mean Rank*** X^2 59.87	Groups
Mango	94.43	A	Soybean	101.13	A
Aonla	92.46	A	Potato	91.26	A B
Guava	91.13	A	Tomato	88.06	A B
Soybean	86.83	A	*Aonla*	73.46	A B
Wheat	85.20	A B	Guava	71.46	A B
Mushroom	78.73	A B	Mushroom	69.13	A B
Maize	40.86	B C	Mango	56.30	A B
Potato	24.20	C	Wheat	53.16	B C
Tomato	18.13	C	Maize	8.00	C

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

Table 4.9.16 indicates that in market driving forces, fruit processors (mango, *aonla* and guava) were ranked higher due to availability of direct marketing facility and direct contact with producers however potato (24.20) and tomato (18.13) processors ranked lower due to low access to online market and market information. In case of market restraining forces, soybean (101) and potato (91.40) processors were ranked higher due to high fluctuation of prices of raw material and difficulty in predicting demand of processed product whereas maize processor (8) got lower rank due to low fluctuation in demand and price.

Table 4.9.17: Mean Rank of Finance Dimension by different types of processors for driving and restraining forces as per Kruskal walis

Financial Driving Forces			Financial Restraining Forces		
Processor	Mean Rank*** X^2 63.83	Groups	Processor	Mean Rank*** X^2 49.179	Groups
Aonla	102.36	A	Potato	110.93	A

Soybean	94.50	A	B		Guava	95.70	A	B	
Wheat	93.23	A	B		Mango	87.46	A	B	C
Guava	88.33	A	B		*Aonla*	73.93	A	B	C
Maize	65.63	A	B	C	Maize	53.43		B	C
Tomato	56.56		B	C	Tomato	50.23			C
Mushroom	55.43		B	C	Soybean	49.16			C
Potato	28.43			C	Wheat	47.86			C
Mango	27.50			C	Mushroom	43.26			C

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

In case of financial driving forces, *aonla* (102.3) followed by soybean (94.5) and wheat (93.23) processors got higher rank due to access to credit facility and information about price policy evident from table (4.9.17). For financial restraining forces, potato (110.93) and guava (95.70) processors were ranked higher due to difficulty in obtaining subsidy and high rate of interest. However, mushroom and wheat processor got lowest ranked due to supporting price policy.

Table 4.9.18: Mean Rank of Legal Dimension by different types of processors for driving and restraining forces as per Kruskal walis

Legal Driving Forces					**Legal Restraining Forces**				
Processor	**Mean Rank*** X^2 76.62**	**Groups**			**Processor**	**Mean Rank*** X^2 93.94**	**Groups**		
Soybean	117.23	A			Guava	118.93	A		
Aonla	90.96	A	B		Mango	118.30	A		
Mushroom	83.96	A	B		*Aonla*	86.10	A	B	
Guava	78.83	A	B		Potato	79.90	A	B	
Wheat	70.86		B		Tomato	55.46		B	C
Tomato	67.10		B		Mushroom	45.36		B	C
Maize	47.76		B	C	Soybean	43.93		B	C
Maize	46.66		B	C	Maize	32.80			C
Potato	8.60			C	Wheat	31.20			C

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

In case of legal driving forces, soybean processor (117.23) was ranked highest due to ease in registering enterprise and GST, following digital payment etc. however, potato processor (8.6) ranked lowest due to difficulty in registering enterprise etc. retrieved from table 4.9.18. In case of legal restraining forces, fruit processor ranked highest due to effect of demonetization on production and labour

payment, difficulty in getting licence and high GST rate, however, these problems were found to be lower in wheat (31) and maize (32.8) processor, hence they were ranked lowest.

Table 4.9.19: Mean Rank of Socio-personal Dimension by different types of processors for driving and restraining forces as per Kruskal walis

Social Personal Driving Forces			Social Personal Restraining Forces		
Processor	Mean Rank*** X^2 46.45	Groups	Processor	Mean Rank*** $X^2$33.76	Groups
Aonla	101.43	A	*Aonla*	90.26	A
Mango	94.93	A	Mango	84.53	A B
Soybean	90.20	A B	Maize	82.40	A B C
Wheat	74.83	A B C	Tomato	81.83	A B C
Guava	64.50	A B C	Guava	81.80	A B C
Maize	62.66	A B C	Wheat	62.70	A B C
Mushroom	45.70	B C	Soybean	48.23	A B C
Tomato	43.70	C	Mushroom	41.10	B C
Potato	34.03	C	Potato	39.13	C

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

Aonla (101.43) processors ranked highest in socio-personal driving forces due to family support and innovativeness in value added products of *aonla* whereas potato (34.03) processor ranked lowest due to lack of access to food processing course (table 4.9.19). In case of socio-personal restraining forces, *aonla* (90.26) and mango (84.53) processors were ranked higher due to lack of entrepreneurial education and poor motivation however, potato (39.13) processor was ranked lowest due to no differences based on caste, official biasness etc.

4.9.20 Overall driving and restraining forces among different types of processor as per Kruskal walis

Table 4.9.20: Overall driving and restraining forces among different types of processor as per Kruskal walis

Total Driving Forces			Total Restraining Forces		
Processor	**Mean Rank*** X^2 293.37 (8)**	**Groups**	**Processor**	**Mean Rank*** X^2 96.91 (8)**	**Groups**
Soybean	614.71	A	Guava	546.35	A
Aonla	567.00	A B	Mango	473.65	A B
Mushroom	463.67	B C	*Aonla*	463.66	A B
Guava	457.08	B C	Potato	444.33	B C
Mango	408.18	C	Tomato	398.36	B C
Wheat	388.72	C	Soybean	382.72	B C
Maize	372.18	C	Maize	338.92	C
Tomato	242.42	D	Mushroom	331.10	C
Potato	135.51	D	Wheat	270.37	C

***significant at <0.001 per cent level; Mean ranks having same letters are not significantly different

From Table 4.9.20 it can be observed that soybean processors (614.71) followed by *aonla* processors (567) were having highest mean rank for total driving forces which indicates that entrepreneurial environment was more conducive for Soybean and *aonla* processor. However, Potato processors (135.51) and tomato processor (242.42) were ranked lowest for total driving forces clearly indicating that entrepreneurial environment for value chain development was least favourable for them. In case of total restraining forces, Guava processor (546) followed by mango processor (473.65) were having highest mean rank indicating restraining forces like lack of follow up program, enterprise diversification support, difficulty in obtaining licence and subsidy etc. were found to be more. However, the above mentioned restraining forces were observed to be less in case of Wheat (270) and Mushroom (331) processor, hence, they were ranked lowest for restraining forces.

Table 4.9.21: Summary of driving forces for different types of processors

Driving Forces	***Aonla***	**Guava**	**Mango**	**Tomato**	**Potato**	**Mush-room**	**Maize**	**Wheat**	**Soybean**
Technical	105.7	77.93	63.46	22.73	19.40	79.86	95.93	27.56	**119.4**
Infrastru-cture	80.20	53.23	67.20	41.06	29.133	107.50	51.93	63.40	**118.33**
Market	92.46	91.13	**94.43**	18.13	24.20	78.73	40.86	85.20	86.83
Financial	**102.36**	88.33	27.5	56.56	28.43	55.43	65.63	93.23	94.50
Legal	90.96	78.83	46.66	67.10	8.6	83.96	47.76	70.86	**117.23**
Socio-personal	**101.43**	64.50	94.93	43.70	34.03	45.70	62.66	74.83	90.20

For technical driving forces, soybean followed by *aonla* processors obtained higher rank due to timely availability and affordability of suitable raw material and access to technical information. Due to institutional support, soybean followed by mushroom processor got higher rank for infrastructure driving force. For market driving force, mango processor got highest rank probably, because of direct contact with producer, direct selling of processed products and online marketing support. For financial driving force, *aonla* followed by soybean processor got higher rank because of access to credit. Because of ease in registering enterprise and GST, soybean followed by *aonla* processor got higher rank in legal driving force. The *aonla* processor got highest rank in socio-personal driving force due to family support.

Table 4.9.22: Summary of restraining forces for different types of processors

Restraining forces	*Aonla*	Guava	Mango	Tomato	Potato	Mush-room	Maize	Wheat	Soybean
Technical	34.33	113.4	86.20	65.10	65.70	57.26	94.66	16.83	78.50
Infrastru-cture	110.50	94.16	48.06	55.96	36.63	58.86	95.36	55.96	56.46
Market	73.46	71.46	56.30	88.06	91.26	69.13	8	53.16	101.13
Financial	79.30	100.66	92.26	54.33	76.40	46.96	57.70	51.80	52.56
Legal	86.10	118.93	118.30	55.46	79.90	45.36	32.80	31.20	43.93
Socio-personal	90.26	81.80	84.53	81.83	39.13	41.10	82.40	62.70	48.23

Table 4.9.22 indicates that guava processor got highest restraining forces in the technical, financial and legal dimensions, respectively. The *aonla* processor got highest rank for infrastructure and socio-personal dimension as restraining forces. For market dimension, soybean processor got highest rank due to fluctuation of prices and demand of processed product.

4.10 Devising strategies to promote value chain

Through Alfares method, assuming 100 per cent to rank 1 the average weight has been worked out for each statement (criteria) within dimension represented in Table 4.10.1. Thus, within post-harvest management dimension, the most important aspect of strategy development was found to provide access to post harvest management techniques (94.73), followed by information about value addition or processing techniques (82.46) and sensitizing the producer about post-harvest losses at individual as well as aggregate level (75.45).

In market dimension, decision makers were of the opinion to stress on contract farming (87.72) to have direct linkage between producers and processor, followed by support for online marketing (83.34) and availability of timely market intelligence (81.85). For infrastructure dimension, collective processing and collective marketing was emphasized much (92.96) followed by provision of cold storage (85.97) and access to machinery for value addition (73.69). Within institutional dimension, district level processing unit was found to be important for strategy making (92.94), followed by providing training (89.47) and motivational support (71.94). Within information dimension, single window delivery system with toll free number (96.49) was found to be most important followed by creating awareness about various government schemes (87.72) and access to credit facility (68.43).

Table 4.10.1: Devising strategy through Alfares method to promote value chain

S. No.	Strategies	Average weight	Rank
1	**Post-harvest management Dimension**		
i.	Sensitizing the producer about post-harvest losses at individual as well as aggregate level	75.45	III
ii.	Provide access to different post-harvest management techniques	94.73	I

iii.	Provide information about several value addition process/ techniques	82.46	II
2	**Market Dimension**		
i.	Timely and regular availability of market intelligence	81.58	III
ii.	Promote direct marketing facility at reasonable price (contract farming between producers & processors)	87.72	I
iii.	Provide online marketing support	83.34	II
3.	**Infrastructure Dimension**		
i.	Provision of cold storage adequately and reasonably	85.97	II
ii.	Facilitate collective processing and collective marketing	92.98	I
iii.	Access to required machinery for value addition	73.69	III
4.	**Institutional Dimension**		
i.	Provide training to promote value addition through KVK etc.	89.47	II
ii.	Encourage district level processing centre	92.98	I
iii.	Motivation and follow up support to producers	71.94	III
5.	**Information Dimension**		
i.	Functional Single window delivery system along with toll free number for providing information to start up agripreneur	96.49	I
ii.	Awareness among producers related to various schemes started by government for promoting entrepreneurship and value addition	87.72	II
iii.	Access to different credit facility availability to producers	68.43	III

4.10.2 Important dimension for devising strategy

Following Alfares method, the aggregate weight (W) has been calculated for each dimension (criteria) assuming 100 % for rank 1 clear from Table 4.10.2. Information dimension (94.62) was found to be most important dimension for devising strategy followed by institutional dimension (86.86), market dimension (83.28), infrastructure dimension (67.16) and post-harvest management dimension (60.59).

Table 4.10.2: Important dimension for strategy making as per Alfares method

Rank	PHM	Market	Infrastructure	Institutional	Information	Wrn
1	0	3	0	3	12	100
2	0	5	0	10	3	89.25
3	2	7	3	3	3	78.50
4	2	3	11	2	0	67.76

5	14	0	4	0	0	57.01
f	18	18	18	18	18	
Aggregate Weight	1090.721	1499.094	1208.934	1563.574	1703.28	
Average W	60.59	83.28	67.16	86.86	94.62	
Rank	**V**	**III**	**IV**	**II**	**I**	

PHM= Post harvest management,
Wrn= Weight as per rank
W= Average weight

Plate 1: Interviewing aonla processor

Plate 2: Retailing of mango pickles

Plate 3: Interacting with wheat processor

Plate 4: Interacting with tomato processor

Plate 5: Interaction with tomato producers

Plate 6: Interacting with mushroom grower

Chapter-5

GENERAL DISCUSSION

The continuous past efforts and strategies taken by government has led to increase in food grain production from 51 million tonnes in 1950-51 to record production of 275.38 million tonnes in 2016-17. The past strategies mainly stressed on package of practices, input supply, quality seed, varieties, irrigation, plant protection measures etc. The food grain production was multiplied by 3.7 times whereas population multiplied by 2.55 times due to adoption of green revolution. Presently, our country is not only self-sufficient in food grain production at aggregate level but also in net exporter. In addition, our country has witnessed the record production of horticultural crop 300.5 million tonnes which has surpassed the annual food grain production. This is showing the changing trend of our farmers towards marketing and economic orientation.

It has been reported by Central Institute of Post-Harvest Engineering and Technology (CIPHET) that annual losses of food grain (8-10%) and horticultural crops (20-40%) are huge due to lack of post-harvest management techniques, poor handling and transportation facilities, inadequate storage facilities and lack of processing. Manifold increase in production without proper post-harvest management and processing is fruitless or simply investing our money, energy and resources for underutilized output. Moreover, production has increased but storage capacity is inadequate to accommodate the increased production as there is huge cold storage gap of about 3.28 million tonnes (MoFPI, 2017) and moreover, the cold storage facilities were available mainly in the wholesale market or nearby. Thus, the problem of glut arises especially in horticultural produce which causes wastage of our resources and losses to farmers. The problem of glut arises due to poor transportation of surplus agriculture produce to scarce area. Another reason for glut is due to lack of market information about demand and supply of produce as well as prices in various market. The high price fluctuation in agricultural produce especially for horticultural produce is major problem which can be addressed through following ways. Firstly, processing is the best alternative as among processed products fluctuation is less compared to fresh produce. Processing enhances the quality, nutritional value, shelf life of products as well as more return

in terms of money to processors. Another approach to avoid glut can be online marketing and eNAM has already been started but its success depends on its implementation and most of the farmers are not even aware of it. Another possible strategy can be providing timely market information and transportation as well as storage facility to transfer the produce to scare area.

For sustainable and inclusive growth of agriculture, there is need to focus on beyond production for effective post-harvest management of agricultural produce by direct consumption or through processing with utmost care and reduce wastage. Only few ICAR institutes are focussing on processing and value addition, so this area can be included as one of the mandate of institutes and processing technologies should be successfully disseminated to farmers. Perceiving the importance of post-harvest management and processing in present scenario the study was undertaken entitled "Critical Analysis of Entrepreneurial Environment for Value Chain Development" to identify the supporting entrepreneurial environment for promoting value chain. The results of the study are discussed for broadly three types agricultural commodities (fruits, vegetables and food grains) in terms of entrepreneurial behaviour, existing entrepreneurial environment for promoting and upgrading value chain, comparing profitability between value added and non-value added produce, efficiency of marketing channel, training requirement of processors for upgrading their enterprises, identifying major reasons for driving and restraining forces and then finally suggesting strategies for value chain development.

5.1 Socio-personal profile

In the present study, majority of processors (48.89 %) and farmers (52.74 %) belonged to the age group of 35-50 years. Reynolds *et. al*. (2000) reported that individuals aged 25-44 years were the most entrepreneurially active The younger individuals would be more inclined to take risks and grow their business (Hambrick & Mason, 1984).

The majority (54.07%) of processors were graduates however, majority of farmers were up to primary level, twenty per cent were up to middle level, and twenty four per cent had passed senior secondary. The importance of education on entrepreneurship has been extensively mentioned in the literature. While some studies reported no relationship between education of the entrepreneur and business

performance (Brush & Chaganti, 1998) however, other studies established that the level of education of the manager has a positive impact on performance (Dunkelberg & Cooper, 1982; Hall, 1995; Westhead, 1995; Julien, 2000; Almus, 2002). Besides the importance of general education identified in the literature, numerous studies have highlighted the importance of entrepreneurship education in the success of small and medium enterprises (SMEs). Entrepreneurship education generally refers to programmes that promote entrepreneurship awareness for career purposes and provide skill training for business creation and development (Vesper, 1990; Bechard & Toulouse, 1998).

The majority (82.96%) of processors have very low experience of less than 15 years. As per literature previous experience includes work experience, business management experience, and industry-specific experience (Rauch & Frese, 2000; Gundry & Welsch, 2003; Guzman & Santos, 2001; Ucbasaran *et al.*, 2004). Many authors were of the opinion that the greater the entrepreneurs' previous experience, the higher their entrepreneurial quality, which would help them to identify opportunities, reduce their initial inefficiency, and also improve their capacity in performing various tasks (Fielden *et al.*, 2000; Guzman & Santos, 2001).

5.2 Fruit as agricultural commodity

The characteristics associated with entrepreneurship were studied in order to determine the differences between entrepreneurs and non-entrepreneurs (Gartner, 1989). Characteristics of the entrepreneur (traits, values, attitudes) are often cited as the most influential factors related to the performance of SMEs and their competitiveness (Man *et al.*, 2002; Simpson *et al.*, 2004; Gurol & Atsan, 2006). According to Markman & Baron (2003), the closer the match between the individual's personal characteristics and the characteristic required for being an entrepreneur, the more successful the individual will be. Thus, it was pertinent to identify the entrepreneurial behaviours of processors and farmers. The significant difference for possessing entrepreneurial behaviour between fruit processors (mean rank 25.22) and fruit grower (mean rank 8.8) has been found at test statistic ($D= +3.06$; $U=4.5$, $p<0.001$). It was observed that many of fruit producers were not following scientific approach and new technologies of orchard management as well as found to be less curious and indifferent in nature. Thus, they scored lower mean value than processors for entrepreneurial behaviour like innovativeness, scientific

orientation, inquisitiveness, resilience, autonomy, critical thinking etc. The present study was in line with the findings of Ahmad (2010), Littunen (2000) who reported that entrepreneurial CEOs have a higher need for achievement, locus of control, risk-taking propensity and tolerance for ambiguity than professional CEOs (non-entrepreneurs). Many studies found that personality characteristics such as high need for achievement, locus of control and propensity for risk-taking have often been associated with successful entrepreneurship (Begley & Boyd, 1987; McClelland, 1987; Miner, 1996; Brandstaetter, 1997). Another author, Kiggundu (2002) found that personality characteristics have direct influence on the success of African entrepreneurs. In contrast, the entrepreneurs were seen as different, not because they shared similar traits, but because of their "entrepreneurial acts" (Gartner, 1989).

Numerous authors suggested that external and internal factors determine the success of enterprises (Penrose, 1959; McCline *et al.*, 2000; Guzman & Santos, 2001; Markman & Baron, 2003). In addition, Miller & Dess (1996) classified the external environment of the enterprise, namely the general and competitive environments. The political-legal, macroeconomic, socio-cultural, technological, demographic and global factors that might affect the organization's activities were included in general environment, whereas, the competitive environment consists of other specific organizations that are likely to influence the profitability of the enterprise, such as customers, suppliers and competitors. The previous studies showed that entrepreneurial environment is determining factor for the performance of enterprise. In the present study, factors of entrepreneurial environment were identified, then scores were calculated. The entrepreneurial environment was found to be much favourable for Aonla processors (2476), followed by Mango processors (2155) and Guava processors (2138). The aonla processors got maximum score among all processors because within 2-3 km of range more than 20 processors were found to be engaged in aonla processing. The reasons for favourable environment among fruit processors were timely and reasonable access to raw material, labour, direct contract with farmers for raw material, direct selling, family involvement in processing, access to quality and safety standards, credit facility etc. promoted value chain for aonla at Pratapgarh, mango at Lucknow, guava at Allahabad. The various sources have identified economic factors, in particular financial resources and taxation, as central for the success of enterprises (Beck *et al.*, 2006; Chu *et al.*, 2007;

Ben Mlouka & Jean-Michel, 2008; Benzing *et al.* 2009). The other literature supported for political and legal factors significantly related to enterprise performance (Yusuf, 1995; Beck *et al.*, 2005; Jasra *et al.*, 2011). Other studies highlighted the positive relationship between technology, information, and infrastructure and business performance (Swierczek & Ha, 2003; Clover & Darroch, 2005; Olawale & Garwe, 2010).

The profitability of enterprises would be discussed in following three sub-heads:

5.1.A. Profitability of Aonla processors and producers

The difference between producers (Rs 6801.95/q) and processors (Rs 949.57/q) wasfound for net return. The processors had7.16 times higher income than producer through processing. However, production unit (365 mt) had more production than processing unit (271 mt) but the price of processed product (Rs. 146.66/ kg) was found to much higher than raw aonla (Rs. 12/Kg) and price fluctuation would be less for processed product. Thus, processing saves from glut problem as well as increases value addition to product and income. The Break Even Point (BEP) at price and yield was found to be economically viable for both the enterprises. Among farmers, channel IV i.e. Producer-Retailer-Consumer (66.67) had high producers' share in consumers' price (66.67) and market efficiency (7.55). Similarly, in case of processors, Channel V i.e. Producer-Processor-Consumer had the highest share in consumers' price (100) and market efficiency (126.83). It shows that producers' share in consumers' price and market efficiency decreases as the number of middleman increases in case of aonla, similar finding reported by Kumbhar, *et al.* in 2014 while processing aonla into candy.

5.1.B. Profitability of Guava processors and producer

The average net return was higher for processors (Rs 5732.88/q) compared to producers (Rs 402.10/q) which is around 2.47 times. However, there was slight difference between average farmers' production (344.20 qtl/unit) and average processors' production (320 qtl/ unit) but the rate for processed product (Rs 162/Kg) was higher than guava (Rs 33/Kg), thus, processing added value to income as well as raw material. The BEP at price (P=12290.1; F=402.10) and at yield (P=207.91; F=38.60) was obtained at much lower point compared to actual average price (P=16200; F=3300) and yield (P=265; F=344.2). Thus, both the units were

economically viable but processors were having more margin and net return (2.08 times) compared to farmers. The producer'sshare in consumers' price (76.19) and marketing efficiency (9.34) were highest in channel IV (Producer-Retailer-Consumer) whereas processors share in consumers' price (100) and market efficiency (134) was highest in channel V (Producer-Processor- Consumer). It can be inferred that direct selling increases the producers' or processors' share in consumers' price as well as market efficiency. Similar observation was reported by study conducted in Allahabad district of UP on Guava found that channel 1 (Producer-Wholesaler-Retailer-consumer) was more advantageous than channel 2 (Producer-Commission agent-Wholesaler-Retailer-consumer) (Manna, 2016). The net profit of the producer declined significantly with the increase in number of intermediaries in the marketing supply chain and the producer's share in consumer's rupee is more in direct sale.

5.1.C. Profitability of Mango processors and producers

The average cost of production (P=Rs 6308.993/q; F= Rs 1420.40/q) and net return (P= Rs 6557.67/q; F=1379.59/q) was higher for mango processors compared to farmers.Again, there was difference between processors' production (300.67Q/unit) and producers' production (91.18 Q/ha) as well as for rate (Product=13600; mango=2800). Thus, in case of mango, the farmers had low production and net return compared to processors. As the middleman increases the processors/ producers' share in consumers' price and marketing efficiency decreases. Thus, Channel I (Producer-Commission Agent-Wholesaler-Retailer-Consumer) was lowest in producers' share in consumers' price (59.52) and Channel VII i.e. Producer-Processor-Retailer-Consumer (86.67) lowest for processors share in consumers' price. Similarly, the marketing efficiency was lowest in channel I (2.75) for producer and channel VII (14.92) for processors. It can be inferred that processors shared more in consumers' price and marketing efficiency after processing the raw material. According to Prasad and Hanumanthaiah (2010) the marketing efficiency was higher in the short market chain, but because of risks (both production and marketing) producers preferred to involve pre-contractor right from the beginning of production to disposing-off the produce. Some of the studies suggested that the more the intermediaries the greater the chance of postharvest losses. The study on grapes revealed that postharvest losses in grapes was found to

be higher at retail level (4.56 %) compared to field level (3.40 %) (Murthy, *et al*., 2014).

The training need among fruit processor was found more in guava processors (2217), followed by mango processors (2108) and aonla processors (2035). The guava (3.7) and mango processors (3.8) had preferred more for technical dimensions of training need for developing innovative value added products or services, learning new processing technology and developing effective financial statement. The aonla processors (3.86) preferred the most important dimension of training as market to address lack of exposure to online market, distant selling of products, determining competition in market etc. Swierczek & Ha (2003) found that lack of equipment and out-dated technologies are among various hindrances to SME development in Vietnam. Another author Gundry *et al.* (2003) agreed that technological change innovations had significant relationship with market growth. Processors not only require training to update them with new technology but also require updated information to compete. Access to new information is indispensable for the initiation, survival and growth of firms (Mead & Liedholm, 1998; Kristiansen, 2002; Duh, 2003; Swierczek & Ha, 2003). Lybaert (1998) found that there is a positive relation between the extent of information use and the performance of SME.

For all fruit based agricultural commodity, the scores of driving forces were higher compared to restraining forces, which means entrepreneurial environment was found to be much important to upgrade value chain. The factors responsible for more driving forces were timely and regular availability of *aonla*, suitable variety, direct marketing of processed products, direct contract between processors and farmers, timely availability of credit facility, awareness of quality and safety standards. However, the major factors responsible for restraining forces were lack of training nearby and its follow up, lack of entrepreneurial education, difficulty in obtaining subsidy, difficulty in getting license etc. The literature supported that accessibility to improved infrastructure services encourage investments, productivity and growth of enterprise; whereas, poor quality and inaccessibility of such services affect the conduct of enterprise by slowing productivity and growth (Clover & Darroch, 2005; Bottasso & Conti, 2010). The timely availability of credit was the major problem of smaller firms as reported by Beck *et al.* (2006).

5.3 Vegetable as agricultural commodity

Since agri-enterprise (processing unit) is the result of continuous interaction of individuals' entrepreneurial behaviour and entrepreneurial environment and the whole process by which agripreneur identify the resources, takes the opportunity and challenge, starts the venture by accepting all risk and reward associated with it is agri-preneurship. For vegetable processors, the average Evaluative, Potency and Activity scores were 5.45, 5.05 and 5.11, respectively for entrepreneurial behaviour. Similarly, for fruit farmers, evaluative, potency and activity average scores were 2.56, 3.91 and 3.62, respectively. D-statistic (Distance statistic) between fruit processors and farmers and found to be 3.45 and significant difference in the entrepreneurial behaviour of vegetable processors (26.47) and vegetable farmers (10.00) was found through test statistic ($U=9$, $p<0.001$). So, it can be concluded that vegetable processors possessed more entrepreneurial behaviour than vegetable farmers. According to Rao and De (2003) majority (60%) of the vegetable growers had medium entrepreneurial behaviour, while 16.00 and 23.30 per cent respondents had low and high entrepreneurial behaviour, respectively.

However, it was observed that tomato famers were following new technology of tomato cultivation *i.e.*, net house and drip irrigation which has improved their yield. Mushroom farmers also had adopted scientific method of farming like instead of *kaccha* house some farmers preferred *pacca* house with well-ventilated thermo-coal walls. So, farmers were found to be innovative (3.08), scientifically oriented (4), autonomous (3.86), manageable (4.37), persistent (4.57) but these entrepreneurial behaviours were relatively less among farmers compared to processors. The processors were found to be more innovative (6.11), scientifically oriented (5.29), resilient (5.58) and have internal locus of control (5.28) etc. as processors were inquisitive towards marketing, creative towards value addition, more exposed to new technologies, took the feedback always in positive way and were highly motivated towards achievement. This study is in contrast with the findings of McNeil *et al.* (1991) that the personality characteristics of an entrepreneur do not seem to differ from the characteristics of a non-entrepreneur. However, Chen, Green, & Crick (1998) were of the opinion that self-efficacy, an entrepreneurial trait, may successfully differentiate entrepreneurs from non-entrepreneurs. In addition, the findings were in harmony with Zhang and Bruning (2011) who were able to provide

empirical support for the positive direct and indirect relations between an entrepreneur's personal characteristics (the need for achievement, internal locus of control and need for cognition) and the business' financial performance.

Delmar (1996) believed that business performance was regulated or guided by the response of the environment (market) in relation to the behaviour of the entrepreneurs. In another word, the business performance is the end result of the performance of an entrepreneur and the reaction of both internal and external environment. Thus, entrepreneurial environment was also studied and found that the entrepreneurial environment for mushroom was much favourable (2601), but for tomato (1760) and potato (1724) processors it was observed to be least. The possible reasons were more than half of muhroom processors (54%) agreed for government support *i.e.*, Haryana Agro Industries Corporation (HAIC) at Murthal, Sonepat extending support to mushroom producer and processors whereas in case of tomato and potato (40%) processors disagreed due to lack of government support for processing unit. Moreover, majority of mushroom processors (53%) agreed for existence of education facilities related to food processing and agripreneurship, however, for tomato (60%) and potato processors (73%) disagreed. Majority of mushroom processors (46%) mentioned about market facility of processed product to Delhi or NCR. The present study is in line with the findings of Sarder *et al.* (1997) who reported that firms receiving support services, such as marketing, management education and training, technical, extension and consultancy, information, and common facilities from the public or private agencies experienced a significant increase in sales, employment and productivity. According to Jasra *et al.* (2011) government support was highly correlated with business success.

The tomato (40%) and potato (46%) processors were of neutral opinion due to lack of access to market. It was found that many of the small processors were processing the agricultural commodities giving to big processors with brand name for marketing. However, credit facility was available to all types of processors but availing subsidy timely was cumbersome. Potato processors (60%) and tomato processors (33.33%) disagreed with the existing technical facility due to lack of access to suitable raw material variety, but mushroom processors (40%) agreed with existing technical facility. Majority of potato processors (40%) were unregistered and do not have licence due to their unawareness however, mushroom processors

were authorized and they availed the legal facility for processing unit. Thus, it can be inferred that for mushroom processors the entrepreneurial environment was conducive at Sonepat due to access to suitable variety of raw material, labour, entrepreneurial education from National Institute of Food Technology Entrepreneurship and Management (NIFTEM), institutional support from HAIC, access to market, machineries requirement and maintenance, access to food quality and safety standards. However, such support were lacking for potato processors at Modipuram and tomato processors at Indore. For tomato, processors were having access to legal factors like registration of unit, issuing licences, awareness of quality and safety standards, registration of GST etc. but access to suitable variety of tomato regularly and at reasonable rate was lacking. At Indore, no farmers were seen growing tomato for commercial purpose.Farmers at Dhar district of Madhya Pradesh preferred to grow tomato but there were few tomato processors in that area. So, because of access to infrastructure, legal, marketing facilities not technical, processors preferred to set up their unit at Indore. Moreover, their units were diversified for other products also like chilli sauce, vinegar, *masala* etc. For potato mostly, small processors were seen due to inadequate and untimely access to raw materials. Only few were found to be registered unit, having licences and GST. They were mainly local processors.

Profitability of vegetables discussed under sub-heads:

5.2.A Profitability of Tomato

It was observed that tomato processors (cost=Rs 6165/q, nr=Rs 262.03/q) had higher cost of production and net return compared to the farmers (cost=Rs 4422/q; nr=Rs 536/q). However, the average farmers' production (727q/acre) was significantly higher than processors' production (300q/unit).The rate of processed product (Rs 113.33/ Kr) was higher than raw tomato (Rs 8/Kg), therefore, processing leads to value addition in terms of income as well as diversified products. The BEP at yield was at 71.63 per cent for processors and 28.75 per cent for farmers whereas BEP at price for processors was at 67.22 per cent and for farmers at 32.75 per cent. High BEP at price and yield was observed for processer due to more total cost of production and fixed cost than farmers. However, both processing and production units were economically viable. BC ratio was higher for producers compared to processors due to high cost of processing compared to cost of tomato cultivation.

Thus, it can be inferred that processing leads to more net income of around 3.17 times of production, increased shelf life of product, reduced the glut problem and wastage.

It was reported that due to the perishable nature of the fruits and vegetables produce, high fluctuations in demand and prices, increasing consumer concerns for food safety & quality (Vorst & Beulens, 2002), and dependence on climate conditions (Salin, 1998) the value chain is complex. Thus, among number of marketing channels, the marketing channel IV (Producer-Retailer-Consumer) and channel V (Producer-Commission agent-Processor-Consumer) had highest producers' (84.21) and processors' (100) respectively share in consumers' price as well as marketing efficiency (F=6.2; P=31.46). For processors, marketing efficiency as well as share in consumers' price was higher compared to farmers, thus, value addition increases the processors share in consumers' price and marketing efficiency. For farmers marketing cost increased when selling their produce to Indore mandi, so they preferred to sell their produce to local mandi or to village merchant. Thus, it was noticed that with increase in actors in marketing channel, the marketing efficiency, share in consumers' pricedecreases and post-harvest losses increases. Similar observation has been seen by the other studies that the existing marketing supply chains of fresh tomato, cabbage and cauliflower (SC1: Producer – Consumer; SC2: Producer - Retailer – Consumer; SC3: Producer - Commission agent - Retailer – Consumer and SC4: Producer - Commission agent -Wholesaler - Retailer - Consumer) in Allahabad district, Uttar Pradesh. The gross marketing price, net marketing price and net profit of producer for fresh tomato, cabbage and cauliflower as well as marketing efficiency and producers' share in consumers' price were significantly higher in marketing supply chain SC1, followed by SC2, SC3 and SC4 (Hena Imtiyaz and Peeyush Soni, 2014; Aggarwal and Saini, 1995; Marothia *et al.*,1996; Radha and Prasad, 2001). The existing chain in fruit and vegetable sector involves many intermediaries who eat up all the share of about 75 per cent of the total net margin accruing to the entire chain (Modi *et al.*, 2009).

5.2.B Profitability of Potato

The difference between processors and farmers for cost of production and net return was huge and it was observed that farmers' cost of cultivation (Rs. 103680/acre) for potato was higher than net return (Rs.-32050/acre). The difference

in average production was significantly higher for processors (580.38q) compared to farmers (220q) as well as rate was higher for processed product (Rs 119.33/Kg) than raw potato (Rs 4/Kg)).

In case of processors, BEP at price (Rs 5841.23/q) was lower than actual rate of product (Rs 11933/q) as well as BEP at yield (338.91q) was lower than actual yield (580.48 q). Thus, processing unit was economically viable. In case of farmers, BEP at yield and price was higher than actual average yield and price of potato at farm gate. Presently, farmers were receiving Rs 4/ kg and BEP at price was obtained at Rs 7.10/ Kg. Hence, it is suggested that price of potato should be increase to save the farmers for paying money from their pocket in order to feed others. It is also suggested to focus on new technology for increasing productivity of potato and disseminating this technology to farmers at the earliest. Otherwise days are not far that they will leave potato farming. The benefit cost ratio was higher for processors than farmers, as producer benefit was too low even to meet cost of cultivation.

The channel IV (Producer-Retailer-Consumer) for potato producers and Channel V (Producer-Processor-Consumer) for potato processors were having highest consumers' share in price (F=50.00, P=100). The marketing efficiency of Channel IV for producers (4.26) and channel V for processor (33.49) was high because of reduction in number of middlemen. In case of producers, producers' share in consumer price (46.67) during off-season selling of potato was more compared to on-season selling due to increase in price of potato during off season whereas, market efficiency was higher for on-season compared to off season due to high marketing cost like storage, sorting and transportation cost during off season potato. For processors, channel V had 100 percent shared in consumers' price and more market efficiency than channel VI. Thus, it clearly shows that marketing efficiency increases with less number of actors in marketing channel. This finding is in contrast to the findings of Shashank Singh (2011) who reported that the share of farmers in the final retail price of potato is more in peak season (58%) when compared with the off season (38%).

5.2.C Profitability of Mushroom

The huge difference was found between mushroom processors and farmers for cost of production (P= Rs 7201.53/q, F= Rs 5074.787/q) and net return (P= Rs

2098.724/q, F=Rs 1425.213/q). According to Singh *et al.* (2010), the total cost of mushroom production varied from Rs 54683 on small farms to Rs 401308 on large farms, with average as Rs 195387 per farm which is in line with the present finding. The processors' production (3668 q/unit) was higher compared to farmers' production (114q/unit) as well as the rate was higher for processed product (Rs 92.46/Kg) compared to mushroom (65.00/Kg). The BEP at price was achieved at 79.27 per cent for processors and 78.07 per cent farmers whereas BEP at yield was achieved at 81.56 per cent for processors and 76.74 per cent farmers. Hence both the units were economically viable. Although both the units were economically viable, but net return was more in case of processors compared to farmers.

The market channel II (Producer-Retailer-consumer) for mushroom farmers and Channel III (Producer-Processor-Retailer-Consumer) for mushroom processors were having highest consumers' price (F=91.42, P=93) as well as market efficiency (F=34, P=37.83). It can be inferred that processors were having high consumers' share and market efficiency than farmers. Also marketing efficiency depends upon the number of intermediaries but with processing the price fluctuation decreases.

As far as training need was concerned, among all the processors, the obtained training need score was highest for potato processors (2272) and tomato (2264) processors because of less favourable entrepreneurial environment and less exposure to new processing technology. The vegetable processors had shown their interest for marketing dimension to diversify value added products, identify potential customer as well as point and volume of sale and learn online marketing and other promotional strategies. Within market dimension of training need for tomato processors, types of value added product from tomato (12.6) followed by potential customer as well as point and volume of sale (10.93) found to be preferred area. However, for potato processors, online marketing (11.13) and selection of agricultural commodities (11.07) observed as most preferred area of training. The reason of selection of agricultural commodities as preferred training need due to irregular and high cost of suitable variety of potato in Modipuram, they were interested in diversifying their unit to other products also. In case of mushroom processors, the preferred area was noticed for types of value added product (13.3) that can be possible, as presently the processors were restricted to canned mushroom only instead of various potential for value addition in mushroom. Within sub-

dimension, promotion found to be most preferred area due to trend of online marketing in present scenario. According to Olawale & Garwe (2010), technology not only helps in evolving a multi-pronged strategy, but also in maximizing business opportunities. According to Rogerson (2001), SMEs need access to appropriate technology if they are to have competitive advantage. Inability to secure technology at start-up can impact negatively on the entrepreneurship development process in today's world of globalization (Clover & Darroch, 2005). Thus, all vegetable processors require training related to recent processing technology to compete in market.

For all vegetable processors, the mean scores of driving forces were more compared to restraining forces. For tomato processors, the factors mainly responsible for driving forces were banking facility, smoothen in registering GST compare to earlier tax, digital payment, GST promoted trade transparency etc. whereas factors responsible for restraining forces were high price fluctuation of tomato, prediction of demand and price of tomato, machinery cost etc. For potato processors, the factors responsible for higher driving forces were direct marketing facility, family support and involvement in processing whereas for restraining forces were high price fluctuation, lack of training, lack of follow up program, high GST rate, demonetization affected turnover etc. In case of mushroom, the major factors responsible for driving forces were timely and reasonable availability of raw material, suitable variety availability, access to technical information, direct contact with farmers, availability of training and courses from HAIC, Institutional support *etc.*, whereas the major factors responsible for restraining forces were high machinery cost, initial investment, difficulty in predicted demand and prices of processed product *etc.* Thus, for all processors, some restraining forces were there. So focus should be given to reduce restraining forces and put more effort on driving forces to promote value chain development. Literature has also pointed out financial resources as the major constraint. Several empirical studies have demonstrated that access to finance constitutes a major constraint to SMEs financing. The small and medium industries faces major problems in obtaining finance compared to large firm due to information asymmetry, lack of collateral, and the higher cost of serving smaller transactions (The International Finance Corporation, 2010). Several authors were also having similar opinion as Schiffer & Weder (2001), Beck *et al.* (2006).

Another problem faced by processing units were complicated tax forms, heavy control by government, and outright misinterpretation of laws (Pratt, 2001; Chu *et al.*, 2007) like recently India faced the effect of demonetization and GST on processing and production unit. Technological factors i.e. access to technology, access to information, and access to infrastructure can affect all aspects of a business, from its overall strategic position to how it manages marketing, design, production, and distribution (Boddy, 2002).

5.2 Food grain as agricultural commodity

The present study found that entrepreneurial behaviour of food grain processors was higher than food grain farmers. It was observed that the food grain farmers (wheat, soybean and maize) were engaged in traditional farming and not much exposed to scientific method of farming. Thus, average farmers possessed low risk (3.5), innovativeness (3.03), scientific orientation (3.43), were inactive (1.89), had external locus of control (2.71), less creative (2.92) and inquisitive (3.04) however, they were persistent (4.29), having knowledge about package of practice (4.42), manageable and resilient but compared to processors these behaviour hold low average scores for farmers. The average processors had high motivation towards achievement (5.44), innovative (6.29), scientifically oriented (4.82), resilient (5.42), autonomous (5.04), inquisitive (5.63) and persistent (5.76) because of their exposure to food processing courses, entrepreneurial education, training, following scientific method of processing etc. Thus, significant difference between average processors and average farmers was observed for entrepreneurial behaviour. The findings was contradictory to the findings of Dollinger (1995) who claimed that the trait approach has not succeeded in providing enough evidence for distinguishing entrepreneurs from others or the key elements of entrepreneurship. Additionally, Wickham (2006) stated that although the trait approach is conceptually powerful, it raises many questions. However, according to Littunen (2000), the typical characteristics of a successful entrepreneur were innovativeness, the ability to take risks and to co-operate, market and manufacturing knowledge, as well as, business management and marketing skills. The finding of Littunen (2002) was in consistent with the present study.

According to Guzman & Santos (2001), the personal environment (firm-based factors) has an impact on entrepreneurship and business success. It includes all

firm-specific factors that are influenced by specific firm action, including the availability of resources, personal skills and abilities for pursuing entrepreneurial functions and the effective use of resources inside the firm (Nieman, 2006). The entrepreneurial environment was found to be promoting for soybean processors (2532) followed by wheat processors (2295) and maize processors (1944). For institutional support that majority of soybean processors (53.33%) agreed that they were getting assistance from Centre of Excellence on Soybean Processing and Utilization, Bhopal, ICAR-Indian Institute of Soybean Research, Indore and Soybean Processing Association of India (SOPA), Indore. Majority of wheat processors (46%) agreed for government support from Indian Agricultural Research Institution (RS), Indore. Majority of maize processors (40%) were getting assistance from Rajendra Prasad Agricultural University (RAU), Pusa and Agriculture College at Dholi. The majority of soybean (40%) followed by wheat (33.33%) processors agreed for existence of entrepreneurial education and food processing courses. Yusuf (1995), in his study on 220 small business entrepreneurs in the South Pacific region, listed nine factors that would contribute to the success of small businesses; but among the most critical factors was satisfactory government support.

For marketing facility, majority of maize processors (60 %) agreed for existing market facility due to availability of distance as well as direct marketing facility. Wheat and soybean processors (33%) were also having favourable opinion towards marketing and financial facility. Because of timely access to suitable raw material variety and skilled labour maize processors (66%), soybean processors (40%) and wheat processors (26) agreed for technical facility. Due to interrupted power supply, maize processors (33%) disagreed with existing infrastructure facility, however, wheat and soybean processors agreed with infrastructure facility. Majority of wheat (40%) and soybean (40%) processors agreed with existing legal facility available for their enterprise registration and issuing licence. However, existing legal facility for maize processors (13.33%) was not satisfactory due to lack of transparency for issuing licence, renewal of enterprise registration, GST registration etc. Dahlqvist *et al.* (2000) pointed out that external factors present opportunities, threats and information with the potential to affect all entrepreneurs within their environment, regardless of their background, education or business concept. Guzman & Santos (2001) listed external factors to include socio-demographics, markets

(local, international, emerging and established markets), cultural, economic, political, institutional, legal, productive, technological, infrastructure and other physical factors of that particular environment. Mazzarol *et al.* (1999) pointed out that these macro-environmental factors were not controllable and the success of the SME often depends on management's ability to deal with them.

Profitability of food grain processors and farmers

5.3. A Profitability of Maize processors and farmers

The significant difference between maize processors and farmers (three seasons) for cost of production (P=Rs 9617.41/q; F=Rs 1196.99/q) and net return (P=Rs 13991.66/q; F=Rs 239.047/q) was found. It was reported that the production costs for maize (one season) varied from Rs. 9360/acre to Rs. 13180/ acre and gross margins also varied from Rs. 1170/ acre to Rs. 10110 /acre, depending on the yield of the crop per season (Kumar *et al.*2012) The production of processors (3722.67 Q/unit) was significantly higher than farmers' production (291 q/unit) as well as rate of processed product (Rs 6880.30/q) was higher than maize (Rs 1317.00/Q) which indicated that processing added value to product as well as to income. It was found that processing unit was economically viable due to its high production but the production unit was not viable either at price or yield. The BC ratio was significantly higher for processors than farmers due to more benefit per unit investment of processors.

For maize farmers, Channel III (Producer-Retailer-Consumer) had highest producers' share in consumers' price (68.75) and marketing efficiency (20.33) due to less number of intermediaries in this channel. There were four types of maize processors like poultry feed maker (Processor I), *namkeen* maker (Processor II), flour maker (Processor III) and seed production (Processor IV). Among these processors, Channel V, VII and VIII were having 100 % in processors' share in consumer price. The poultry feed processor was found to have only one channel IV (Producer-commission agent-processor-trader-retailer-consumer) with market efficiency of 12.47. *Namkeen* making processors were having two channels V and VI but channel V was having slightly higher market efficiency (120.21) due to direct selling. The marketing efficiency of Channel VII (*flour* making) and channel VIII (seed production) were 499 and 408.4 respectively. It was observed that with

decrease in intermediaries the efficiency of marketing channel increases. From previous finding it was observed that marketing cost was highest in Channel IV i.e. Rs. 10.2 and margin was also more as compared with other four channels i.e. Rs. 17.71 per quintal of maize. But in case of producer's share in consumer's rupee was Rs. 91.33 which was higher in channel II than Channel I, III, IV and V. The marketing efficiency (2.30) found to be highest in channel II. Thus, with increase in intermediaries share in consumers' price and market efficiency decreases (Srikanth, 2017).

5.3. B Profitability of Wheat processors and farmers

It was found wheat processors (cost= Rs 5130.34/q& nr= Rs 1061.35/q) has higher cost of production and net return than farmers (cost= Rs 3850.78/q& nr= Rs 848.22/q). Dawit and Basavaraja in 2004 evaluated economics of production and marketing of wheat for the year 2000 in Dharwad district. It was reported that average cost of cultivation of wheat was Rs. 8883.07 and farmers obtained 9.75 quintals of wheat. Thus the cost of production was Rs. 911 per quintal of wheat and on average farmers received Rs. 1094 per quintal from main and by produce. The other study depicted that on an average farmers could produces wheat at the cost A1 of Rs.14614 per hectare followed by Rs. 14701 cost B1, Rs. 18201 cost B2, Rs. 20258 cost C1, Rs. 23758 cost C2 and Rs. 26133 cost C3. The average yield of wheat in study area was found to 23.67 quintal per hectare (Yadav, 2013). In present study, processors where having high production and rate of their processed product (P= Rs 86/kg; F= Rs 17.67 /Kg) than farmers. The BEP at price and at yield for processors and producers were lower than actual price and yield, thus, both the units were economically viable.

For farmers, channel III had highest producer's share in consumers' price (87.5) and market efficiency (21.98) due to direct selling of wheat. Among processors, there were two types of processors; Processors I (semolina, *dalia*, cattle feed etc.) and Processors II (Bakery products). Among Processors I, channel IV and V were having highest processors share in consumers' price (100) and market efficiency (87.23 & 51.38 respectively). Among Processors II, channel VII has the highest share in consumers' price (100) and market efficiency (124.98). It was observed that processors were having more shares in consumers' price and market efficiency than farmers.

5.3. C Profitability of Soybean processors and farmers

The cost of production and net return was higher for processors (cost=Rs 3313.98/q& nr=Rs 2236.39/q) compared to farmers (cost=Rs 2447.53/q& nr= Rs 766.39/q). The difference in rate of processed product (Rs 9243/qtl) and soybean (Rs 3145/qtl) was significant. However, the break even at yield was achieved much earlier than actual yields. Thus, both the units were economically viable. The benefit cost ratio was higher for processing unit (1.58) than production unit (1.34) due to more benefit in processing enterprise. The previous study reported that the average production of soybean per farm was found to be 37.09 quintals of which 1.84 quintal was utilized as family requirement. This may be as seed purpose, wages and other uses. Thus, it can be concluded that 5.00 per cent of the total soybean produce was utilized for various consumption purpose and remaining 95.00 per cent of the produce remained as marketable surplus Parmer (2013).

It was observed that among soybean farmers, producers' share in consumers' price and market efficiency (Acharya's formula) was the highest in channel III during off season. In case of processors, channel III, IV and V share more in consumers' price (100) and market efficiency (18.89, 25.96 and 115.67) due to direct selling of processed product. The similar result was obtained byRathore (2004) who found three marketing channels of soybean marketing. Channel I: Producer – village merchant- wholesaler-processors, Channel II: Producer – wholesaler- processors; Channel III: Producer – ITC Company- processors. The study revealed that the producers' share in consumers' rupee was found to 73.23 per cent in channel III, which was highest, followed by channel II (72.85%) and channel I (71.88%). This revealed that with the increase in the number of market functionaries in the marketing process, there is reduction in producers' share in consumers' rupee. Similar, findings were reported by Sharma and Nahatkar (2004), Sirohee (2005), Soni *et al.*. (2005), Parmar (2013).

As per training need, soybean processors require less training (1953) followed by wheat (2001) and maize (2105) processors. The maize processors required training mainly in the area of promotion for promoting online marketing facility (11.46), however, wheat processors wanted training for increasing the nutritional value of their processed product followed by determining prices of their products among target consumer. Soybean processors were interested in training

need for developing different type of value added products (12.7) followed by determining the competition (12.1) and for developing networking skill. Numerous studies have documented a positive association between networking and enterprise performance (Duchesneau & Gartner 1990; Zhao & Aram, 1995). There is a large volume of published studies describing the role of customer relationship management as a key factor in enterprise performance (Dwyer *et al.*, 1987; Morgan & Hunt, 1994; Berry, 1995; Sheth & Parvatiyar, 1995). Similarly, an increasing amount of literature has highlighted the effect of suppliers on the performance of businesses (Dollinger & Kolchin, 1986; Gelinas & Bigras, 2004; Morrissey & Pittaway, 2006). Other researchers have argued that an analysis of the role of competitors and counter-competition intelligence and actions are crucial for the survival of an SME (Ligthelm & Cant, 2002; Rwigema & Venter, 2004; Nieman, 2006). Thus, these areas become essential for training requirement like networking skill, determining competition, demand and price of products etc.

It can be inferred that driving forces (105.93) was fairly high compared to restraining forces (56.6) in case of maize processors. In driving forces, major factors contributing were reasonable and local availability of maize, availability of suitable processing variety, institutional support etc. and for restraining forces, major contributing factors were lacking enterprise diversification support, lack of training, lack of follow up program, interrupted power supply etc.

The driving forces (108.6) were significantly higher than retraining forces (49.12) in case of wheat processors for upgrading value chain. The major factors responsible for the driving forces were affordability and timely availability of wheat, easily and locally availability of suitable variety, institutional support, online marketing, digital payment etc. Whereas the factors responsible for restraining forces were middleman existence, high GST rate, problem in negotiating contracts, difficulty in getting subsidy etc.

For soybean processors, driving forces (124.06) were found to be significantly higher than restraining forces (56.73). In driving forces, the major factors responsible for it were institutional support, timely availability of soybean, suitability of variety, grading facility, online marketing etc. However, the major factor responsible for restraining forces were lack of enterprise diversification support, lack of follow up program, difficulty in predicting demand and price

fluctuation, high cost of machinery etc. Several researchers have argued that the general state of an economy, in which a firm competes, influences the performance of a business (Boddy, 2002; Ligthelm & Cant, 2002; Gurol & Atsan, 2006; Nieman, 2006). Thompson (2001) pointed out that economic conditions affect how easy or how difficult it is to be successful and profitable at any time because they affect both capital availability and cost, and demand.

Other factors like government policies such as labour regulations, anti-trust policy and environmental policy promoted the growth of firms, whereas government policies such as regulations of foreign trade and policies that promote domestic price volatility hindered business growth (Harabi, 2003). In India, when demonetization was implemented processors were not having money to give payment to labours. The effect was seen on their turnover etc. Now due to GST many of the processors were of the opinion that it promoted transparency, digital payment but some processors were agreed for high GST rate which is in line with Robertson *et al.* (2003) pointed out that one of the key factors inhibiting SME development is taxation. If tax rates are high, they reduce the profit incentive drastically (Ahwireng-Obeng & Piaray, 1999). Other performance determining factors for enterprise were finance and legal system according to Beck *et al.* (2006).

Policy suggestions

The 'single window delivery system' along with toll free number for providing information to agri-start-ups need to be promoted, so that agripreneurs can easily contact and get necessary information from the proposed centre.

Since awareness and information plays the major role to agri-start-ups so necessary steps should be taken to create awareness through media. Care should be taken to provide authentic and viable steps or solutions to interested agri-start-ups. Priority should be given to their area of interest. Farmers-friendly communication networks should be established to transform Indian farmers from being information-poor to information-rich.

Institutional support may be provided through timely training at nearby centres with follow up programmes. The training should be given in relevant areas so that the participants can utilize their learning effectively. Motivational and inspiration support should be extended to promote value chain.

Stress should be given to promote effective contract farming between producers and processors at reasonable and remmunerative price to both. Care should be taken to avoid conflict or weaker contract by promoting more professionalism or favourable environment.

There is a need to focus on commodity specific and community based processing centres for instance Allahabad is red colour guava belt so if commodity based processing centre is established at block or district level then jelly can be easily prepared without adding edible colour to it. Similarly, there is a need to start commodity based processing centres at different region like Malihabad region of Lucknow for mango, Pratapgarh for aonla, Sonipat for mushroom etc.

Emphasis should be given on partnership between local processors and institutions; so that local processors can produce desirable quality of value added products and supporting institutions help in marketing of the products through ensuring quality, branding, packaging and exporting. Most of the processors are working in an isolated manner, thus immense need to integrate them also.

Most of the projects started by government are limited to progressive farmers or adopted villages rather than reaching to resource poor farmers. Thus, vibrant programmes should be undertaken, mass awareness should be created regarding programme objectives for ensuring active participation of farmers or target groups.

Competency of development officers at district and block level should be improved.They should be sensitized with grassroots problems and issues of society.

Stress should be given on infrastructure and storage facilities, availability of timely market information, institutional support and credit facilities etc. for efficient value chain development.

Awareness about various schemes started by government for promoting value chain and agripreneurship should be created and it should be ensured that beneficiaries can timely avail those benefits.

Timely access to credit facilities and new schemes to provide credit support should be emphasized at reasonable interest rate with a low payback period. Also, timely subsidy and loan should be made available by bringing more transparency and reducing cumbersome process.

Timely market intelligence should be stressed and its authenticity should be maintained. Technical facilities like raw material availability, skilled labour, training, processing technology should be provided to the processors.

Infrastructure support like access to machinery, its repair and maintenance, cold storage etc. should be taken care. The power and water supply should be checked. Stress should be given on commodity-specific value chain and every effort should be done to popularize success stories of processing. Rewards and incentives should be arranged for successful farmers.

Chapter-6

SUMMARY AND CONCLUSION

India holds major position in production of most of agricultural commodities but at the same time the post-harvest losses for agricultural commodities estimated to be high in commodities like foodgrains (8-10%), horticultural products (20-40%) and animal and fisheries products (10-12%) (CIPHET, 2015). Out of the total production of fruits and vegetables, nearly 76 per cent is consumed in fresh form, while wastage and losses account for 20 to 22 per cent. Only 2 per cent of vegetable production and 4 per cent of fruit productions are being processed (MoFPI, 2016). So, the need of hour is to focus on beyond farm production and productivity, diversification of agriculture, developing farmers' capacity for processing and linking them with market and other supporting institutions. Therefore, promotion of an efficient value chain is critical for the accelerated agricultural development and also for increasing producers' shares in consumer prices. We need entrepreneurs or processors for promoting value chain. Entrepreneurial behaviour can be operationally defined as behaviour of an individual that entails different processes undertaken by him in creation of new firms and is the result of continuous interaction of personal factor and entrepreneurial environment. Thus, the present study aims to identify the entrepreneurial behaviour of stakeholders and entrepreneurial environment for value chain development, to map the value chains, to identify training needs of entrepreneurs and to formulate strategies for inducing entrepreneurial behaviour and creating environment for value chain development.

6.1 Specific Objectives:

1. To assess the entrepreneurial behaviour of stakeholders and entrepreneurial environment for value chain development
2. To develop and analyze the value chain maps of selected commodities under study
3. To identify training needs for enhancing the entrepreneurial competencies for value chain development
4. To study the constraints in value chain development and devise a strategy to

create entrepreneurial environment to facilitate the value chain development.

6.2 Research Methodology

6.2.1 Research Design

The present study adopted an *ex-post facto* research design. Based on post-harvest losses and/or potential for undergoing value chain development nine agricultural commodities like food grains (Maize, Wheat and Soybean); vegetables (Potato, Tomato and Mushroom) and fruits (Mango, Guava and Aonla) were selected purposively. After the selection of agricultural commodities, the states and further districts were selected purposively for each identified agricultural commodities based on high production under crop and/or potential for value chain. Selected districts for the present study were Samastipur, Bihar (Maize), Modipuram (Potato), Lucknow (Mango), Allahabad (Guava), Pratapgarh, Uttar Pradesh (Aonla), Sonepat, Haryana (Mushroom), Dhar (Tomato) and Indore, Madhya Pradesh (Wheat, Soybean). Detailed analyses of availability of respondents were carried out with the assistance of experts from IARI, KVKs, IARI Regional Stations and State Agricultural Universities. A comprehensive list of entrepreneurs and producers were developed with the help of experts.

6.2.2 Reliability and validity of different scales used in the study

1. Training need assessment of processors coefficient of internal consistency (Spearman's rho) = 0.785 and Cronbach alpha coefficient = 0.855. The overall content validity index (S-CVI/Ave) was 0.93.
2. Modified scale of Gills (2015) for constraints or restraining forces among processors was used. Its reliability and validity was checked again. The coefficient of internal consistency (Spearman's rho) = 0.95 and Cronbach alpha coefficient = 0.92. The overall content validity index (S-CVI/Ave) was 0.90.
3. Modified scale of Gills (2015) for constraints or restraining forces among farmers was used. Its reliability and validity was checked again. The coefficient of internal consistency (Spearman's rho) = 0.96 and Cronbach alpha coefficient = 0.85. The overall content validity index (S-CVI/Ave) was 0.92.

6.2.3Sampling and data collection

A stratified random sampling was followed in selection of respondents. From each of the identified agricultural commodity based stratum a random sample of 15 entrepreneurs who were engaged in value addition were selected. Further, 20 farmers in each vegetables and food grain agricultural commodities and 25 farmers from each fruit (orchard) agricultural commodities were selected (only producer) from extensive list of farmers in corresponding districts. Among 25 farmers, in case of orchard, 20 farmers were selected for orchard of age ≥10 years and 5 farmers were selected for orchard in establishment stage (3), 4 to 6 year of orchard (1) and 7 to 9 year of orchard (1). In addition, 45 other stakeholders *i.e.*, commission agent, wholesaler, retailer etc. five from each agricultural commodity. Further, 18 experts from institutions *i.e.*, Research station, KVK personnel *etc.*, were randomly selected for all the commodities under consideration for this study. Thus total sample size of this present study was 393. The collected data were analysed with the help of SPSS 20 software and XLSTAT software to draw valid conclusion.

6.3 Major Findings

6.3.1 Comparison of entrepreneurial behaviour of processors and producers

- After calculating average scores of EPA (Evaluative, Potency and Activity) factors, D-statistic (Distance statistic) was calculated between fruit processors and producers as 3.06. Significant difference in the entrepreneurial behaviour of fruit processors (25.22) and fruit producers (8.8) was found at test statistic ($U=4.5$, $p<0.001$). For risk taking, both the groups got similar mean value, as producers were also seen taking moderate risk like processors. It was observed that many of fruit producers were not following scientific approach and new technology of orchard cultivation as well as found to be less curious and indifferent in nature. Thus, they scored mean value less than processors for entrepreneurial behaviour like innovativeness, scientific orientation, inquisitiveness, resilience, autonomy, critical thinking etc. However, it was noticed that processors were in search of new technology, information and they critically think before implementing any new approach and were seen to manage properly, patiently even in adverse condition. It was noticed that they have high will power, not getting easily

influenced by external factors, utilize even negative feedback in a positive manner, and wish to do differently than others.

- The D-statistic (Distance statistic) calculated between vegetable processors and producers and found to be 3.45. The significant difference in the entrepreneurial behaviour of vegetable processors (26.47) and vegetable producers (10.00) was found through Mann Whitney test (U=9, $p<0.001$). Vegetable producers were innovative (3.08), scientifically oriented (4), autonomous (3.86), manageable (4.37), persistent (4.57) but these entrepreneurial behaviours were relatively less among producers compared to the processors. The processors were more innovative (6.11), scientifically oriented (5.29), resilient (5.58), had internal locus of control (5.28) etc. Processors were inquisitive towards marketing, creative towards value addition of vegetables, always take the feedback in positive way and highly motivated towards achievement.
- The D-statistic (Distance statistic) calculated between food grain processors and producers was found to be 5.09. The significant difference in the entrepreneurial behaviour of average processors and average producers was seen at test statistic (U= 7; $p<0.001$). Food grain producers preferred to take low risk (2.5), lack innovativeness (2.64) and scientific approach (3.04) in cultivation of crop, less inquisitive (2.17) towards new method of farming but they were seen persistent (4.06), manageable (3.39), resilient (3.92) and knowledgeable (4.08) towards package of practices, so their farming was successful. However, food grain processors used to take more risk (6.45), highly motivated towards achievement (6), innovative (6.73), scientific oriented (5.25), creative (5.85), take feedback in positive manner (6). Thus, wide difference was seen between processors and producers for possessing entrepreneurial behaviour.
- Based on mean score mushroom processors got first rank (2601) for existing entrepreneurial environment followed by soybean processors (rank II) and aonla processors (rank III). The lowest existing entrepreneurial environment was found for potato processors (rank IX) preceded by tomato processor (rank VIII) and maize processors (rank VII).

6.3.2 Comparative profitability between processing unit and production unit in various selected agricultural commodities

- The cost incurred in aonla processing unit ((Rs 7864.715/q) was much higher than production unit (Rs 252.92/q) due to high investment in machineries, utilities (power etc.), expenses (GST, storage, transportation etc.), labour charge etc. Though the investment (31.09 times) was more for aonla processing unit, but net return was also higher in case of processing unit (Rs 6801.952/q)) compared to production (Rs Rs 949.57/q) unit (Table 4.4.1). Thus, processing helps in realizing more income, increasing shelf life of product, reducing wastage etc. It was observed that the rate of processed product (Rs 14666.67/q) was more than raw aonla (Rs 1200/q).
- In case of guava processing unit, cost incurred was much higher than guava production unit around 26 times due to high initial investment as well as high recurring cost. In addition, net income realized by processing unit (Rs 5732.886/q) was more than production unit (Rs 2317.22/q). In addition the rate of processed products (Rs 16200/q) was more than raw guava (Rs 3300/q).
- The cost incurred in mango processing (Rs 6308.99/q) was higher than production unit (Rs 1420.40/q) due to heavy investment in processing enterprise. The net return was also found to be more in mango processing (Rs 6557.67/q) than production unit (Rs 1379.59/q). The cost incurred in processing unit was 4.44 times and net return was 4.75 times more than production unit.
- The cost incurred in tomato processing was 23.53 times and net return was 8.22 times of production unit. Thus, cost (Rs 6165.97/q) and net return (Rs 4422.91)of processing was more than production. However, the rate of processed product (Rs 11333.34/q) was more than fresh tomato (Rs 800/q). Therefore, processing leads to value addition in terms of money as well as diversified products.
- The processing unit was found to incur more cost (Rs 6334.12/q) around 13.14 times than production unit (Rs 481.99/q). In addition, net return was higher for processing unit (nr=Rs 5710.30/q). The rate was higher for processed product (Rs 11933/Q) than raw potato (Rs 400/Q)).

- The mushroom processing unit had high cost incurred (1.41 times) and net return (1.47 times) than production unit. In addition, the rate of processed product (Rs 9246.32/q) was higher in processing unit. The break-even point at yield and price was achieved at 81.56 and 79.27 per cent in case of processing unit and at 76.74 and 78.07 per cent in case of production unit.
- The huge difference for cost incurred in maize production (Rs 9617.41/q) and processing unit (Rs 1196.99/q) was observed due to heavy investment in processing like machinery cost, GST, other expenses and utilities, labour charge etc. However, net return of processing unit (Rs 13991.66) was 58.53 times more than production unit (Rs 239.07/q) as well as rate of processed products was 5 times higher than fresh maize. Thus, it can be inferred that processing adds value in terms of income as well as product diversification. In addition, processing reduces post-harvest losses and increases shelf life of raw material. It was observed that fluctuation in price was more in raw material compared to finished products.
- The cost incurred in wheat processing unit unit (Rs 5130.34/q) was much higher than production unit (Rs 1061.35/q) due to high investment in machineries, utilities (power etc.), expenses (GST, storage, transportation etc.), labour charge etc. Although investment was more for processing unit, but net return was also higher in case of processing (Rs 3850.77/q) unit compared to production unit (Rs 848.22/q).
- In soybean processing, cost incurred was much higher than soybean production around 1.35 times due to high initial investment as well as high recurring cost. However, net income realized by processing unit (Rs 2236.39/q) was more than production unit (Rs 766.39/q). Moreover, the rate of processed products (Rs 9243.33/q) was more than raw wheat (Rs 3145/q).

6.3.3. Assessing the market channel and price spread of producers and processors

- The aonla producers' share in consumers' price decreases as the number of middlemen increases, thus channel IV *i.e.*, Producer-Retailer-Consumer (66.67) had high producers' share in consumers' price and channel I (60) had lowest share. Similarly, in case of aonla processor, Channel V *i.e.*, Producer-Processor- Consumer (100) was having highest share in consumers' price

than Channel VI and VII (97.29). It can be inferred that compared to producer, processors were having more share in consumers' price. Similarly, marketing efficiency decreases as the number of middleman increases. Among producers, Channel IV (7.55) and among processors, Channel V (126.83) possessed highest marketing efficiency.

- The guava producers' share in consumer price (76.19) and marketing efficiency (9.34) were highest in channel IV *i.e.*, Producer-Retailer-Consumer whereas guava processors' share in consumer price (100) and market efficiency (134) were highest in channel V *i.e.*, Producer-Processor-Consumer. It can be inferred that direct selling increases the producers' or processors' share in consumer price as well as market efficiency.
- As the middlemen increases, the mango processors'/producers' share in consumers' price and marketing efficiency decreases. Thus, Channel I (Producer-Commission Agent-Wholesaler-Retailer-Consumer) was the lowest in mango producers' share in consumers' price (59.52) and Channel VII *i.e.*, Producer-Processor-Retailer-Consumer (86.67) had lowest processors' share in consumers' price. Similarly, the marketing efficiency was the lowest in channel I (2.75) for producer and channel VII (14.92) for processor.
- In case of tomato, Channel IV (Producer-Retailer-Consumer) and Channel V (Producer-Commission agent-Processor-Consumer) had highest producers' (84.21) and processors' (100) share in consumers' price respectively, as well as marketing efficiency (F=6.2; P=31.46).
- In case of potato, channel IV (Producer-Retailer-Consumer) for potato producers and Channel V (Producer-Processor-Consumer) for potato processors were having highest consumers' share in price (F=50.00, P=100). The marketing efficiency of Channel IV for producers (4.26) and channel V for processor (33.49) was high because of reduction in number of middlemen. Producers' share in consumer price (46.67) during off-season selling of potato was more compared to on-season selling due to increase in price of potato during off season whereas, market efficiency was higher for on-season compared to off season due to high marketing cost like storage, sorting and transportation cost during off season potato.

- Channel II (Producer-Retailer-consumer) for mushroom producers and Channel III (Producer-Processor-Retailer-Consumer) for mushroom processor were having highest share in consumers' price (F=91.42, P=93.78) as well as market efficiency (F=34, P=37.82).
- In maize, Channel III (Producer-Retailer-Consumer) had highest producers' share in consumers' price (68.75) and marketing efficiency (20.33 due to less number of intermediaries in this channel. Among processors, Channel V, VII and VIII were having 100 % in processors' share in consumer price. The poultry feed processor was found to have only one channel IV (Producer-commission agent-processor-trader-retailer-consumer) with market efficiency of 12.47. *Namkeen* making processors were having two channels V and VI but channel V was having slightly higher market efficiency (120.21) due to direct selling. The marketing efficiency of Channel VII (*flour* making) and channel VIII (seed production) were 499 and 408.4 respectively. It was observed that with decrease in intermediaries the efficiency of marketing channel increases.
- Among wheat producers, channel III (Producer-Retailer-Consumer) had highest producers' share in consumers' price (87.5) and market efficiency (21.98) due to direct selling of wheat. Among processors, there were two types of processors, *i.e.*, Processor I (semolina, dalia, cattle feed etc.) and Processor II (Bakery products). Among Processor I, channel IV and V were having highest processors' share in consumers' price (100) and market efficiency (87.23 & 51.38 respectively). Among Processor II, channel VII has highest share in consumers' price (100) and market efficiency (124.98).
- Among soybean producers, producers' share in consumers' price and market efficiency (Acharya's formula) were highest in channel III (Producer-Wholesaler/Miller-Processor-Consumer) during off season. In case of processor, channel III, IV and V obtained more share in consumers' price (100) and market efficiency (18.89, 25.96 and 115.67) due to direct selling of processed product.

6.3.4Preferred major dimensions of training need in each type of processors

- Aonla processors (3.86) preferred the most important dimension of training as market due to their lack of exposure to online market, distant selling of

products, determining competition in market etc. However, guava (3.7) and mango processors (3.8) had preferred technical dimension of training need for developing innovative value added products or services, learning new processing technology and developing effective financial statement. Among vegetable and food grain processors, all had shown their interest for marketing dimension as training need to diversify their value added products, identify potential customer as well as point and volume of sale and learn online marketing and other promotional strategies.

- There was significant agreement as per Kendall's concordance coefficient (W= 0.931 at X^2 25.13 (3); p <0.001) among nine types of processors that marketing dimension (3.78) was the major dimension of training need. After marketing, processors agreed for technical dimension (3.22) followed by information dimension (2) and social responsibility (1) for training need.
- In case of market, tomato processors (109.26) had shown highest interest for training need due to their desire to develop more value added product from tomato, however Maize processors (97.20) were interested in promoting their products through online market and other schemes. In case of technical dimension, Potato (115.5) and Guava processors (105.46) had shown more interest because of their need for effective financial planning followed by use of modern technology and developing innovative value added products or services. In case of information, guava (112.06) and aonla processors (102.60) had shown more desire for training due to their requirement for information and support to agri-start up, its expansion and diversification. Other reasons were their need of information about new technology and how to search and utilize data from authorized sources. Mushroom (97.66) and tomato processors (93.76) had shown high interest in social responsibility dimension of training need for effective utilization of funds and resources, reduce the deleterious effect of processed product on human health and to comply with government rules.
- The guava, mango, tomato and potato processors form cluster 2. This group of processors required similar types of training as these processors were having comparatively less favourable supporting entrepreneurial environment and they obtained highest scores for training need. The third cluster included

the following processors *i.e.*, Mushroom processor, Maize processor, Wheat processor and Soybean processor, whohad similar training need due to favourable supporting entrepreneurial environment and they obtained lower training need scores compared to cluster 2. Only aonla processors fall in cluster I, which might be due to much favourable and promoting entrepreneurial environment for aonla processor at Pratapgarh.

- The maximum score for training need was obtained by potato processors (2272) followed by tomato processors (2264) due to less favourable entrepreneurial environment. The minimum score for training need was obtained by soybean processors (1953), followed by wheat processors (2001) and *aonla* processors (2035).

6.3.5To identify the driving forces and restraining forces for upgrading value chain among processors

- In case of aonla processors, driving forces (120.86) was higher compared to restraining forces (64.26) which indicates that entrepreneurial environment was quite promoting to upgrade value chain at Pratapgarh in Uttar Pradesh for aonla processing. The factors responsible for higher driving forces were timely and regular availability of *aonla* (5), suitable variety (4.8), direct marketing of processed products (5), direct contact between processor and producers (4.8), credit facility (4.9), awareness of quality and safety standards (4.4). However, the major factors responsible for restraining forces were lack of training nearby (2.75) and its follow up (3.7), lack of entrepreneurial education (2.7), difficulty in obtaining subsidy (2.2), difficulty in getting license (2.8) etc.
- The driving forces (111.4) were significantly higher than restraining forces (71.53) in case of guava processors. The driving factors for upgrading value chain were easily and locally availability of guava (5), suitable variety of guava i.e. red guava (4.7), access to training and courses on food processing (4.2), GST promoted trade transparency (4) etc. Whereas, the restraining factors for up gradation of value chain were lack of follow up training (4.1), lack of enterprise diversification support (4), high GST rate (2.6), and demonetization affected turnover (4.1).

- The driving forces (108.54) were significantly higher compared to restraining forces (66.06) for upgrading value chain in case of mango processors (pickles processor). The major factors responsible for driving forces were timely availability of raw mango (4.8), suitable variety (4.6), institutional support (4.2), direct marketing of processed product (4.8), direct contact with producers for raw mangoes (4.6), online marketing (4), digital payment (4.2) etc. However, the forces restraining the up gradation of value chain were demonetization affected labour payment (4.2), demonetization affected turnover (4), difficulty in obtaining subsidy (2.75), licence (3.5), high GST rate (2.2) and lack of enterprise diversification support (4.2).
- In case of tomato, The factors mainly responsible for driving forces were banking facility (4), smooth registering of GST compared to earlier tax (4), digital payment (4.2), GST promoted trade transparency (3.8) etc. The factors mainly responsible for restraining forces were high price fluctuation of tomato (3.8), prediction of demand and price of tomato (2.8), machinery cost (2.8) etc.
- The driving forces (89.18) were higher in comparison to restraining forces (57.93) in case of potato processor to upgrade value chain. The factors responsible for higher driving forces were direct marketing facility (4.3), family support and involvement in processing (4.8) and for restraining forces were high price fluctuation (3.8), lack of training (3.1), lack of follow up program (2.8), high GST rate (2.5), demonetization affected turnover (2.6) etc.
- In case of mushroom, the major factors responsible for driving forces were timely and reasonable availability of raw material (5), suitable variety availability (4.7), access to technical information (3.8), direct contact with producers (4.7), availability of training and courses from HAIC (4.4), Institutional support (5) etc. The major factors responsible for restraining forces were high machinery cost (3.5), initial investment (2.8), difficulty in predicted demand and prices of processed product (3.4) etc.
- The driving forces (105.93) were fairly high compared to restraining forces (56.6) in case of maize processor. In driving forces, major factors contributing were reasonable and local availability of maize (5), availability

of suitable processing variety (4.8), institutional support (4) etc. and for restraining forces, major contributing factors were lacking enterprise diversification support (3.5), lack of training (2.7), lack of follow up program (3.6), interrupted power supply (2.6) etc.

- The driving forces (108.6) were significantly higher than retraining forces (49.12) in case of wheat processor for upgrading value chain. The major factors responsible for driving forces were affordability and timely availability of wheat (4.4), easily and locally availability of suitable variety (3.6), institutional support (4), online marketing (4.4), digital payment (4.4) etc. Whereas, the factors responsible for restraining forces were middleman existence (2.8), high GST rate (2.3), problem in negotiating contracts (2.1), difficulty in getting subsidy (2.1) etc.
- The driving force (124.06) was found to be significantly higher than restraining forces (56.73) for soybean processors compared to other types of processors. In driving forces, the major factors responsible were institutional support (5), timely availability of soybean (4.6), suitability of variety (4.6), grading facility (4.7), online marketing (4.6) etc. However, the major factors responsible for restraining forces were lack of enterprise diversification support (3.5), lack of follow up program (3.3), difficulty in predicting demand and price fluctuation (2.5), high cost of machinery (2.4) etc.
- In case of driving forces, processors (39.10) possessed significantly higher mean rank than producers (21.90). For restraining forces, producers (45.33) possessed significantly higher mean rank than processors (15.67). Thus, it can be inferred that driving forces were higher for processors and restraining forces were higher for producers. Entrepreneurial environment was same for processors and producers, but the processors were more opportunity seeking and had higher risk taking ability so, they took the challenges because of entrepreneurial behaviour. Thus, it is suggested that we should focus on developing entrepreneurial behaviour among producers as well as making the environment conducive for agripreneurship.

6.3.6Devising strategies to promote value chain

- The information dimension (94.62) was found to be most important for devising strategy followed by institutional dimension (86.86), market

dimension (83.28), infrastructure dimension (67.16) and post-harvest management dimension (60.59).

- In market dimension, decision makers were of the opinion to stress on functional contract farming (87.72) to have direct linkage between producers and processor, followed by support for online marketing (83.34) and availability of timely market intelligence (81.85). For infrastructure dimension, collective processing and collective marketing was emphasized much (92.96) followed by provision of cold storage (85.97) and access to machinery for value addition (73.69). Within institutional dimension, district level processing unit was found to be important for devising strategy (92.94), followed by providing training (89.47) and motivational support (71.94). Within information dimension, functional single window delivery system with toll free number (96.49) was found to be most important followed by creating awareness about various government schemes (87.72) and access to credit facility (68.43).

6.3.7 Implications of the study

- The study has highlighted the difference between farmers and processors for possessing entrepreneurial behaviour.
- It helped in analysing the present entrepreneurial environment for promoting value chain development.
- The value chain maps for selected agricultural commodities were developed which indicates the existing activities, actors and entrepreneurial environment in value chain.
- The scale was developed under present investigation to measure the training need of processors.
- The study identified the driving and restraining forces for promoting value chain development among processors and farmers
- The strategy was formulated based on opinion of experts from different institutions.

Critical Analysis of Entrepreneurial Environment for Value Chain Development

ABSTRACT

India holds major position in most of agricultural commodities but at the same time the post-harvest losses for agricultural commodities estimated to be high and only insignificant proportion of agricultural produce is being processed. Thus need to emphasize on processing and value addition, developing the skills of farmers in this area and linking them with market and other supporting institutions. Therefore, development and promotion of an efficient value chain is critical for the accelerated development of agriculture sector and for increasing producers' shares in consumers' price. Moreover, promoting value chain development and establishing an enterprise, require degree of some entrepreneurial behaviour among processors which is the result of continuous interaction of personal factor and entrepreneurial environment. Considering the above mentioned factors, the present study was carried out to analyse the entrepreneurial behaviour and entrepreneurial environment for promoting value chain, developing value chain map in selected agricultural commodities, identifying training needs of agripreneurs engaged in food processing and to formulate strategies for inducing entrepreneurial behaviour and environment for promoting value chain development.

The present study adopted an *ex-post facto* research design. Based on post-harvest losses and/or potential for undergoing value chain development, nine agricultural commodities like food grains (Maize, Wheat and Soybean); vegetables (Potato, Tomato and Mushroom) and fruits (Mango, Guava and Aonla) were selected purposively. After the selection of agricultural commodities, the states and further districts were selected purposively for each identified agricultural commodities based on high production under crop and/or potential for value addition. Selected districts for the present study were Samastipur, Bihar (Maize), Meerut (Potato), Lucknow (Mango), Allahabad (Guava), Pratapgarh, Uttar Pradesh (Aonla), Sonepat, Haryana (Mushroom), Dhar (Tomato) and Indore, Madhya Pradesh (Wheat, Soybean). Data was collected from 15 processors, 25 fruit producers, 20 vegetable producers and 20 food grain producers in each agricultural commodity. Further, 45 other stakeholders (intermediaries i.e. wholesaler, retailer; five from each commodity) and 18 experts (for devising strategy) were also interviewed, thus, total sample size of the present study was 393.

The entrepreneurial behaviour between average processor and average farmer was compared through semantic differential technique and there was a significant difference

between them. The existing entrepreneurial environment was most favourable for mushroom processor (rank I) followed by soybean (rank II) andaonla processor (rank III). The lowest existing entrepreneurial environment was found for potato processor (rank IX) and tomato processor (rank VIII).

The profitability between production and processing unit was compared for selected agricultural commodities and it was found that in processing unit cost incurred and net return was higher than production unit. It was also noticed the rate of processed products was more than raw material thus net income of processor was higher. Both the production and processing units were found to economically feasible as per break-even point at yield and price except potatoproduction unit for break-even yield.

The marketing channels were identified for selected agricultural commodities for both processor and producer. It was found that producers'/ processors' share in consumers' price and market efficiency increases with decrease in intermediaries. The value chain maps were developed for selected agricultural commodities indicating major activities, actors of value chain and entrepreneurial environment through venn diagram.

There was significant agreement among nine types of processors that marketing (3.78) was the major dimension of training need followed by technical (3.22), information (2) and social responsibility (1) dimension of training need. The market was most important dimension of training due to their lack of exposure to online market, promotional strategies, distant selling of products, determine competition in market, need to diversify their value added products, identify potential customer as well as point and volume of sale etc.

The force field analysis was used to identify the driving and restraining forces and it was found that in case of driving forces, average processors (39.10) possessed significantly higher mean rank than average producers (21.90) and for restraining forces, average producers (45.33) possessed significantly higher mean rank than average processors (15.67). For devising strategies the experts were interviewed and Alfares method (2009) was used to analyse the data.Information dimension (94.62) was found to be the as most important aspect for strategy devising followed by institutional support (86.86), market facility (83.28), infrastructure (67.16) and post-harvest management aspect (60.59).

Keywords: Post-harvest losses; Value chain; Entrepreneurial environment; *Ex-post facto;* Processors; Producers; Marketing channels; Break-even point; Venn diagram; Force field analysis; Alfares method.

मूल्य संवर्धन विकास के लिए उद्यमी पर्यावरण का महत्वपूर्ण विश्लेषण

सारांश

अधिकांश कृषि उत्पादन में भारत का प्रमुख स्थान है, परन्तु बहुत सारा कृषि उत्पाद कटाई उपरांत व्यर्थ हो जाता है और बहुत ही कम उत्पादन का प्रसंस्करण और मूल्य संवर्धन किया जाता है। इस सन्दर्भ में खाद्य प्रसंस्करण और मूल्य संवर्धन में जोर देना व इस क्षेत्र में किसानों का कौशल विकास करना और बाजार से जोड़ना आज की प्राथमिकता है। इसलिए, कृषि क्षेत्र के विकास और उपभोक्ताओं के मूल्य में उत्पादकों के शेयरों में वृद्धि के लिए एक कुशल मूल्य श्रृंखला का विकास महत्वपूर्ण विषय है। इसके अलावा, मूल्य श्रृंखला विकास को बढ़ावा देने और एक उद्यम की स्थापना के लिए, प्रसंस्करण करने में कुछ उद्यमी गुण मौजूद होने की आवश्यकता होती है जो व्यक्तिगत गुण व उद्यमी वातावरण के परस्पर सम्बन्ध का परिणाम है। उपर्युक्त कारकों को ध्यान में रखते हुए, प्रस्तुत अध्ययन किया गया।

वर्तमान अध्ययन में एक्स पोस्ट फैक्टों अनुसंधान डिजाइन अपनाया गया। फसल कटाई के नुकसान और/या मूल्य संवर्धन विकास की सम्भावनाओं को देखते हुए विभिन्न, खाद्य उत्पादों जैसे अनाज (मक्का, गेहूँ और सोयाबीन); सब्जियां (आलू, टमाटर और मषरूम) और फल (आम, अमरूद और आंवला) जानबूझकर चुना गया। कृषि वस्तुओं के चयन के बाद, राज्यों और उसके बाद जिलों को उच्च उत्पाद के आधार पर चुना गया। वर्तमान अध्ययन के लिए चयनित जिलों यथा समस्तीपुर (मक्का), मेरठ (आलू), लखनऊ (आम), इलाहाबाद (अमरूद), प्रतापगढ़ (आंवला), सोनीपत (मशरूम), धार (टमाटर) और इन्दौर (गेहूँ और सोयाबीन)। डेटा को 15 प्रोसेसर, 25 फल उत्पादक, 20 सब्जी उत्पादक और 20 कृषि अनाज उत्पादकों से प्रत्येक कृषि वस्तु में एकत्र किया गया। इसके अलावा, 45 अन्य हितधारकों (मध्यस्थों अर्थात थोक व्यापारी खुदरा विक्रेता; प्रत्येक वस्तु से पाँच) और 18 विशेषज्ञों (रणनीति तैयार करने के लिए) का भी साक्षात्कार किया गया, इस प्रकार, वर्तमान अध्ययन का कुल प्रतिदर्श आकार 393 था।

औसत प्रोसेसर और औसत किसान के बीच उद्यमशील व्यवहार की तुलना अर्थपूर्ण अंतर तकनीक के माध्यम से की गयी थी और उनके बीच एक महत्पूर्ण अन्तर पाया गया। मौजूदा उद्यमशीलता वातावरण मशरूम प्रोसेसर (रैंक I) के लिए सबसे अधिक अनुकूल था, इसके बाद सोयाबीन (रैंक II) और आंवला प्रोसेसर (रैंक

III) में पाया गया। सबसे कम मौजूदा उद्यमी वातावरण आलू प्रोसेसर (रैंक IX) और टमाटर प्रोसेसर (रैंक VIII) के लिए पाया गया था।

चयनित वस्तुओं के उत्पादन एवं खाद्य प्रसंस्करण के लाभ का तुलनात्मक अध्ययन करने पर पता चला कि प्रसंस्करण इकाई का खर्चा एवं लाभ दोनों की ज्यादा है और यह भी पाया गया कि प्रसंस्कृत उत्पाद का मूल्य अधिक था। उत्पादन एवं प्रसंस्करण इकाई दोनों ही आर्थिक रूप से सुदृढ थी तथा लाभ–अलाभ स्थिति उत्पादन तथा मूल्य पर विजिबल पाया गया सिर्फ आलू को छोड कर।

प्रसंस्करण कर्ता एवं उत्पादन दोनों में ही मार्केटिंग चैनल का अध्ययन किया गया। यह पाया गया कि बिचोलियों की संख्या कम होने पर उत्पादन एवं प्रसंस्कृत का लाभांश बढ़ जाता है। वैल्यू चैन मैप के जरिये प्रमुख गतिविधियों, अभिनेताओं और उद्यमशीलता वातावरण का वेन आरेख माध्यम से अध्ययन किया गया।

बजार (३.७८) के क्षेत्र में सबसे अधिक प्रशिक्षण की जरूरत महसूस हुयी तथा तकनीकी ज्ञान (३.२२), सूचना (२) एवं सामाजिक जिम्मेदारी (१) जैसे विषयों को भी प्रषिक्षण के लिए उपयोगी पाया गया। ऑनलाईन मार्केटिंग, प्रमोशनल रणनीति आदि की कमी होने के कारण बाजार को प्रशिक्षण के लिए प्राथमिकता दी गयी।

प्रेरक एवं निरोधक बल को अध्ययन करने के लिये फॉर्स फील्ड एनालिसिस का प्रयोग किया गया है। प्रेरक बल के सम्बन्ध में प्रसंस्करण (३९.१०) के लिये औसत माध्य स्कोर ज्यादा पाया गया है और निरोधक बल के सम्बन्ध में उत्पादक (४५.33) का औसत माध्य स्कोर ज्यादा पाया गया। वैल्यू चैन विकास की रणनीति बनाने के लिए विशेषज्ञों को साक्षात्कार किया गया और आंकड़ा विश्लेषण के लिए अल्फरेस विधि का उपयोग किया गया। रणनीति बनाने के लिए सूचना (९४.६२), संस्थागत सहायता (८६.६६), बाजार सुविधा (८३.२८), संरचना सुविधा (६७.१६) और कटाई उपरांत प्रबंधन को इसी प्राथमिकता के क्रम में महत्वपूर्ण पाया गया।

कीवर्डः कटाई उपरांत व्यर्थ, मूल्य श्रृंखला, उद्यमी वातावरण, एक्स पोस्ट फैक्टों, प्रोसेसर, मार्केटिंग चैनल, लाभ–अलाभ स्थिति, वेन आरेख, फॉर्स फील्ड एनालिसिस, अल्फरेस विधि।

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ANNEXURE I

Cost of Aonla Cultivation

Establishment cost of Aonla for initial 3 years (n=3)

S.N	Particulars	Cost (Rs/ ha)
1	Preparation of land	4825
2	Digging and Filling of pits	9550
3	Manures	1340
4	Fertilizer	485
5	Pesticides	335
6	Cost of plant (250/hac)	6812.5
7	Planting, handling & transportation charge	1250
8	Irrigation charge	700
9	Intercultural operation	2490
10	Cutting & Pruning	1805
11	Fencing	28900
12	Miscellaneous	1910
13	Initial investment cost	60402.5
14	Rental value of land (3 years)	150750
15	Interest rate on fixed capital @10%	21870
16	Interest rate on initial investment @ 4%	7248.3
17	Depreciation on farm equipment & building	9075
18	Total establishment cost	245325.8
19	Net Return from Intercropping of 3 years	12825.15
20	Net establishment cost	232500.8

year	Cost of orchard	Net return from intercrop	Net cost of aonla orchard during gestation period
1	245325.8	5925.05	239400.8
2		4125.1	235275.8
3		2775	232500.8

S.N	Particulars	Stage of age of Aonla Plant (Years)		
		4-6 (n=1)	7-9 (n=1)	10 (n=20)
1	Land rent	50250	50250	50250
2	Amortized fixed cost	31248.11	31248.11	31248.11
3	Operational cost	10256.9	17627.5	26301.5
4	Depreciation on est cost @4%	2500	3000	3025
5	Interest on working capital @4%	410.276	705.1	1052.06
6	Interest on fixed capital @ 10%	5000	5500	5950
7	Total cost	99665.28	110380.7	117826.67
8	Production (250pl/ha) (qtl)	175	380	470.5
9	Gross return (12/kg)	210000	456000	564600
10	Total Net benefit of orchard	110334.7	346669.3	446773.9
11	B:C ratio	2.1083706	4.17	4.80
12	BEP at Price (Rs/Q)	569.5159	287.7124	252.94
13	BEP at Yield (Qtl/ha)	47.45966	23.97603	98.18

Cost of Guava Cultivation

Establishment cost of Guava for initial 3 years (n=3)

S.N	Particulars	Cost (Rs/ ha)
1	Preparation of land	3675
2	Digging and Filling of pits	2265
3	Manures	2030
4	Fertilizer	2110
5	Pesticides	1369.5
6	Cost of plant (250/hac)	5090.625
7	Planting, handling & transportation charge	1505
8	Irrigation charge	11965
9	Intercultural operation	2750
10	Cutting & Pruning	1970
11	Plant replacement charge	1900
12	Fencing	28900
13	Miscellaneous	1045
14	Initial investment cost	64675.13
15	Rental value of land (3 years)	1,62,000
16	Interest rate on fixed capital @10%	23,325
17	Interest rate on initial investment @ 4%	7,989
18	Depreciation on farm equipment & building	11,895
19	Total establishment cost	2,71,784
20	Net Return from Intercropping of 3 years	19805.3
21	Net establishment cost	251979

year	Cost of orchard	Net return from intercrop	Net cost of guava orchard during gestation period
1	2,71,784	8000	263784
2		6030	257754
3		5775	251979

S.N	Particulars	Stage of age of Guava Plant (Years)		
		4-6 (n=1)	7-9 (n=1)	10 (n=20)
1	Land rent	54000	54000	54000
2	Amortized fixed cost	26997.77	26997.77	26997.77
3	Operational cost	12093.83	24656.17	33332
4	Depreciation	2800	3700	3,965
5	Interest on working capital @4%	483.7533	986.2467	1333.28
6	Interest on fixed capital @ 10%	6860	7250	7,775
7	Total cost	101835.4	115610.2	127402.5
8	Total Production (160pl/ha) (qtl) a) Jan b) Aug	103.4667 53.33333 50.13333	254.8614 129.5281 125.3333	495.68 169.2 326.481
9	Gross return a) Jan (Rs 18/Kg) b) Aug (Rs 15/Kg)	171200 96000 75200	419892.1 225600 194292.1	870840 253800 617040
10	Total Net benefit of orchard	69364.65	304282	743437.5
11	B:C ratio	1.68	3.63	6.853046

12	BEP at Price (Rs/Q)	988.69	455.15	402.1053
13	BEP at Yield (Qtl/orchard)	30.85	35.03	38.60683

Cost of Mango Cultivation

Establishment cost of Mango for initial 5 years

S.N	Particulars	Cost (Rs/ ha)
1	Preparation of land	7575
2	Digging and Filling of pits	6075
3	Manures	9125
4	Fertilizer	5565
5	Pesticides	11710
6	Cost of plant (100 pl/hac)	4261.25
7	Planting, handling & transportation charge	1800
8	Irrigation charge	10200
9	Intercultural operation	8250
10	Cutting & Pruning	3840
11	Fencing	35745
12	Miscellaneous	1050
13	Initial investment cost	105196.25
14	Rental value of land (5 years)	1,63,750
15	Interest rate on fixed capital @10%	41,291
16	Interest rate on initial investment @4%	21,039
17	Depreciation on farm equipment & building	22,407
18	Total establishment cost	3,53,683
19	Net Return from Intercropping of 5 years	22500
20	Net establishment cost	331183.3579

Year	Cost of orchard	Net return from intercrop	Net cost of mango orchard during gestation period
1	3,53,683	7000	346683.3579
2		5500	341183.3579
3		4000	337183.3579
4		3500	333683.3579
5		2500	331183.3579

S.N	Particulars	Stage of age of Mango Plant (Years)		
		5-8 (n=1)	9-11 (n=1)	12-15 (n=20)
1	Land rent	32750	32750	32750
2	Amortized fixed cost	44511.04	44511.04	44511.04
3	Operational cost	21084.24	37558.91	52955
4	Depreciation	3658	3845	3975
5	Interest on working capital @4%	843.3695	1502.357	2118.2
6	Interest on fixed capital @ 10%	5815.33	6553.55	7325
7	Total cost	108662	126720.9	143634.2
8	Production (100pl/ha) (qtl)	50	80	102.25
9	Gross return (28/kg)	140000	224000	286300

10	Total Net benefit of orchard	31338.02	97279.14	142665.8
11	B:C ratio	1.28	1.76	1.99
12	BEP at Price (Rs/Q)	2173.24	1584.011	1420.409
13	BEP at Yield (Qtl/ha)	77.61	56.57	51.29794

Cost of Tomato Cultivation

Cost of Tomato cultivation in net house (n=20) in Rs/ acre		
S.N	Items	Cost (Rs/acre)
I	**Operational Cost**	
1	Plant cost (9000 plants/acre @ Rs 1.2/ plant)	10940
2	Fertilizer a) Basal fertilizer b) Through Drip	 3351.9 3625
3	Manures	-
4	Pesticides	4350
5	Mulching	2670
6	Irrigation charge	1720
7	Labour charge	5405
8	Staking charges	6810
8	Interest on working capital	1281.53
9	Miscellaneous	291.5
A	Total operational cost	39163.4
II	**Fixed cost**	
1	Rental value of land	14950
4	Depreciation on farm implements and building	18445
5	Interest on fixed capital	29575
B	Total Fixed cost (A+B)	62970
III	**Total cost**	102133.4
IV	Yield (Q)	437.5
V	Gross Income	350000
VI	**Net Income**	247866.6
VII	**B:C ratio**	3.4

Cost of Potato Cultivation

Cost of Potato cultivation (n=20) in Rs/ha		
S.N	Items	Cost (Rs/ha)
I	**Operational Cost**	
1	Seed (30Q/ha @ Ru 600/Q)	18850
2	Fertilizer	14280
3	Manures	2975
4	Pesticides	3300
5	Weedicides	741.25
6	Irrigation	1050
7	Labour charge	57573
8	Interest on working capital	348.995

9	Miscellaneous	345
A	Total operational cost	100775.9
II	**Fixed cost**	
1	Rental value of land	43250
2	Depreciation on farm implements and building	2205
3	Interest on fixed capital @10%	1420
B	Total Fixed cost (A+B)	46926
III	**Total cost**	149363.6
IV	Yield (q/ha) a) baby potato b) large potato	312.5 100.5 212.0
V	Gross Income a) baby potato @ 50-100/Q b) large potato @ 400-480/Q c) total	 10050 88535 98585
VI	**Net Income**	-50778.6
VII	**B:C ratio**	0.66

Cost of Mushroom Cultivation

Cost of Mushroom cultivation per farm (n=20)		
S.N	Items	Cost (Rs/farm)
A	Investment on building a) Kaccha b) Pacca c) Total	 32770 102500 135270
B	Investment on equipment a) Tray, tub, baskets etc. b) Electrical fitting, Exhaust etc. c) Spray, pipes, pump d) Thermometer, knife e) Weighing balance f) Motor g) Others h) Total	 1865 3525 1495 137 312 2175 1245 9509
C	Total Investment	1,44,779
I	**Operational Cost**	
1	Compost (570 Q @ Rs 700/Q)	399000
2	Spawn (750gm/Q compost) (Rate Rs 70/ Kg)	29925
4	Pesticides & Insecticides	4560
5	Casing soil	8550
6	Irrigation charge	1050
7	Labour charge	63300
8	Interest on working capital @4%	20294.8
9	Miscellaneous	985
A	Total operational cost	527664.8
II	**Fixed cost**	

1	Rental value of land	2,650
2	Depreciation on *Kachha* building	7,373
3	Depreciation on *Pakka* building	3690
4	Depreciation on farm implements	2852.7
5	Interest on fixed capital @ 10 %	14477.9
B	Total Fixed cost	61749.89
III	**Total cost**	568708.7
IV	Yield (Q/ Farm)	114
V	Gross Income (65/Kg)	741000
VI	**Net Income** (Rs/Farm)	172291.4
VII	**B:C ratio**	1.28

Cost of Maize Cultivation

Cost of Maize cultivation (n=20) in Rs/acre				
S.N	**Items**	**Rabi**	**Summer**	***Kharif***
I	**Operational Cost**			
1	Land Preparation	5560	5560	5560
2	Seed	1280	1280	1280
3	Fertilizer	4935	4935	4935
4	Manures	6000	6000	6000
5	Pesticides	202.4	202.4	202.4
6	Weedicides	424.5	424.5	424.5
7	Irrigation	7845	8560	1960
8	Labour charge	6450	4840	4470
9	Miscellaneous	545.5	545.5	545.5
A	Total operational cost	33242.4	32347.4	25377.4
II	**Fixed cost**			
1	Rental value of land	3244.8	3244.8	3244.8
4	Depreciation on farm implements and building	2115	2115	2115
5	Interest on fixed capital	4025	4025	4025
	Interest on working capital	1330.13	1294.33	1015.53
B	Total Fixed cost (A+B)	10714.94	10679.14	10400.34
III	**Total cost**	43968.34	43037.54	35777.3
IV	Yield (Qtl/season)	36.85	25.55	23.8
V	Gross Income a) Main Product b) Fodder c) Cob d) Total	 44220 (@1200/Q) 5262.5 3415 52897.5	 38325 (@1500/Q) 4895 2842.5 46062.5	 29750 (@1250/Q) 4511.25 3406.25 37667.5
VI	**Net Income**	8929.164	3024.964	1890.20
VII	**Total Net Income**	13867.21		

Cost of Wheat Cultivation

Cost of Wheat Cultivation (n=20) in Rs/acre		
S.N	Items	Cost (Rs/acre)
I	**Operational Cost**	
1	Seed (55-70 kg/acre)	1372.4
2	Fertilizer	1129.55
3	Manures	-
4	Pesticides	-
5	Weedicides	250.5
6	Irrigation	437.5
7	Labour charge	6828
8	Interest on working capital @ 4%	412.718
9	Miscellaneous	300
A	Total operational cost	10730.67
II	**Fixed cost**	
1	Rental value of land	5615
2	Depreciation on farm implements and building	418.3673
3	Interest on fixed capital @ 10 %	1306.122
B	Total Fixed cost (A+B)	7339.49
III	**Total cost**	18070.152
IV	Yield (Qtl/acre) a) Grain b) Straw	 17.15 9.65
V	Total Gross Income a) Grain (Rs 1735-1800) b) Straw	32720.25 30307.75 2412.5
VI	**Net Income**	14650.09
VII	**B:C ratio**	1.81

Cost of Soybean Cultivation

Cost of Soybean cultivation (n=20) in R/acre		
S. N	Items	Cost (Rs/acre)
I	**Operational Cost**	
1	Seed (35-45 kg/acre)	1601.25
2	Fertilizer (DAP & Urea/ 1 bag)	1627.25
3	Manures	-
4	Pesticides	1590
5	Weedicides	322.5
6	Irrigation	-
7	Labour charge	5502.5
8	Interest on working capital	654.64
9	Miscellaneous	220
A	Total operational cost	11518.14
II	**Fixed cost**	
1	Rental value of land	5615

2	Depreciation on farm implements and building	418.3673
3	Interest on fixed capital	1306.122
B	Total Fixed cost (A+B)	7339.49
III	**Total cost**	18857.63
IV	Yield (Qtl/acre) a) Grain (Rs 2700-3700/Q) b) Straw	 7.9 2.175
V	Total Gross Income a) Grain b) By product	25296.25 24752.5 543.75
VI	**Net Income**	6438.62
VII	**B:C ratio**	1.34

ANNEXURE II

Cost of Aonla Processing units (n=15)

S.N	Particulars	Cost (Rs)
	WORKING CAPITAL	
1	Aonla	2,94,000
2	Other processing ingredients (including packing material)	3,19,200
3	Labour charge	4,78,800
4	Utilities (Power, water, fuel etc.)	1,99,500
5	Other expenses (GST, licence fee, storage charge, repair & maintenance, Advertisement etc.)	5,39,786.6667
A	**Total Working Capital**	**18,31,286.667**
	FIXED CAPITAL	
1	Machinery & equipment	2,53,600
2	Land rent	36000
B	**Total Fixed Capital**	**2,89,600**
C.	**Total Capital Invested (A+B)**	**21,20,886.667**
	FINANCIAL ANALYSIS	
D	**Cost of production per annum**	
1	Total recurring cost	18,31,286.667
2	Depreciation charge	15216
3	Interest on total capital invested @ 12 %	2,54,506.4
	Total	**21,01,009.067**
1	Production (Q)	272
2	Rate (Rs/Kg)	147
E.	**Turnover**	**39,90,000**
F	**Net Profit (E-D)**	**18,88,990.933**
G	Net Profit Ratio (D/E*100)	47.34313116 %
H	Rate of return (D/C*100)	89.066095 %
I	**B:C ratio**	**1.908185814**
J	**Break Even Point (Fixed cost*100)/(Fixed cost*Net Profit)**	
i	Fixed Cost	
1	Depreciation	15216
2	Rent	36000
3	Interest on total investment	254506.4
4	40 % of salary	191520
5	40 % of other expenses	215914.6667
i	Total Fixed Cost	7,13,157.1
J	**BEP (%)**	27.40
K	**BEP at Price (Rs/Q)**	9354.572549
L	**BEP at yield (Q/unit)**	173.4848
M	Increase in value of processed product over fresh aonla (Rs)	1594990.933
N	% increase in value of processed product over fresh aonla	542.5139229

Cost of Guava Processing units (n=15)

S.N	Particulars	Cost (Rs)
	WORKING CAPITAL	
1	Guava	6,43,466.67
2	Other processing ingredients (including packing material)	480866.6667
3	Labour charge	769386.6667
4	Utilities (Power, water, fuel etc.)	288520
5	Other expenses (GST, licence fee, storage charge, repair & maintenance, Advertisement etc.)	624541.3333
A	**Total Working Capital** (6 months)	2806781.333
	FIXED CAPITAL	
1	Machinery & equipment (6 months)	1,29,333.33
2	Land rent (6 months)	28,200
B	**Total Fixed Capital** (6 months)	157533.3333
C.	**Total Capital Invested (A+B)** (6 months)	2964314.667
	FINANCIAL ANALYSIS	
D.	**Cost of production per annum**	
1	Total recurring cost	2806781.333
2	Depreciation charge	11,640
3	Interest on total capital invested @ 12 %	355717.76
	Total	3174139.093
1	Production (Q)	263.33
2	Rate (Rs/Kg)	162
E.	**Turnover**	4808666.667
F	**Net Profit (E-D)**	1634527.573
G	Net Profit Ratio (D/E*100)	66.00871538
H	Rate of return (D/C*100)	107.0783453
I	**B:C ratio**	1.60
J	**Break Even Point (Fixed cost*100)/(Fixed cost+ Net Profit)**	
i	Fixed Cost	
1	Depreciation	11640
2	Rent	28200
3	Interest on total investment @ 12 %	355717.76
4	40 % of salary	307754.6667
5	40 % of other expenses	249816.5333
	Total Fixed Cost	953128.96
K	**BEP [FC*100/(FC+Profit)]**	36.83
L	**BEP at Price (Rs/Kg)**	122.90
M	**BEP at yield (Q/unit)**	207.9713893
N	Increase in value of processed product over fresh guava (Rs)	991060.9067
O	% increase in value of processed product over fresh guava	154.0189971

Cost of Mango Processing units (n=15)

S.N	Particulars	Cost (Rs)
	WORKING CAPITAL	
1	Mango (300 Q/unit)	350466.6667
2	Other processing ingredients (including packing material)	426000
3	Labour charge	511200
4	Utilities (Power, water, fuel etc.)	85200
5	Other expenses (GST, licence fee, storage charge, repair & maintenance, Advertisement etc.)	394086.6667
A	**Total Working Capital**	1766953.333
	FIXED CAPITAL	
1	Machinery & equipment	1,08,266.6667
2	Land rent	78,800
B	**Total Fixed Capital**	**26,39,913.333**
C.	**Total Capital Invested (A+B)**	1954020
	FINANCIAL ANALYSIS	
D.	**Cost of production per annum**	
1	Total recurring cost	350466.6667
2	Depreciation charge	23,818.66667
3	Interest on total capital invested @ 12 %	234482.4
	Total	2025254.4
1	Production (Q)	300.6666667
2	Rate (Rs/Kg)	134
E.	**Turnover**	4260000
F	**Net Profit (E-D)**	2234745.6
G	Net Profit Ratio (D/E*100)	47.5411831
H	Rate of return (D/C*100)	103.6455308
I	**B:C ratio**	**2.12**
J	**Break Even Point (Fixed cost*100)/(Fixed cost+ Net Profit)**	
i	Fixed Cost	
1	Depreciation	23818.66667
2	Rent	78,800
3	Interest on total investment @ 12 %	234482.4
4	40 % of salary	204480
5	40 % of other expenses	157634.6667
	Total Fixed Cost	699215.7
K	**BEP [FC*100/(FC+Profit)]**	23.83
L	**BEP at Price (Rs/Kg)**	7933.379
M	**BEP at yield (Q/unit)**	171.7305
N	Increase in value of processed product over fresh mango (Rs)	1884278.933
O	% increase in value of processed product over fresh mango	537.6485448

Cost of Tomato Processing units for 6 months (n=15)

S. N	Particulars	Cost (Rs)
	WORKING CAPITAL	
1	Tomato (300 Q/unit)	225266.6667
2	Other processing ingredients (including packing material)	256933.3333
3	Labour charge	642333.3333
4	Utilities (Power, water, fuel etc.)	224816.6667
5	Other expenses (GST, licence fee, storage charge, repair & maintenance, Advertisement etc.)	392866.6667
A	**Total Working Capital**	1742216.667
	FIXED CAPITAL	
1	Machinery & equipment	5,20,000
2	Land rent (6 months)	31,600
B.	**Total Fixed Capital**	5,51,600
C.	**Total Capital Invested (A+B)**	22,93,817
	FINANCIAL ANALYSIS	
D.	**Cost of production per annum**	
1	Total recurring cost	1742216.667
2	Depreciation charge	15,600
3	Interest on total capital invested @ 12 %	1,37,629
	Total	18,95,446
E.	**Turnover**	3211666.67
1	Production (Q)	300
2	Rate (Rs/Q)	113.333333
F	**Net Profit (E-D)**	13,16,221
G	Net Profit Ratio (D/E*100)	59.01750908
H	Rate of return (D/C*100)	82.63283174
I	**B:C ratio**	1.74
J	**Break Even Point (FC*100)/ (FC + Net Profit)**	
i	**Fixed Cost**	
1	Depreciation	15,600
2	Rent	31,600
3	Interest on total investment	1,37,629
4	40 % of salary	256933.3333
5	40 % of other expenses	157146.6667
	Total Fixed cost	5,98,909
J	**BEP [FC*100/(FC+Profit)]**	31.27249847
K	**BEP at Price (Rs/Q)**	7618.90
L	**BEP at yield (Q/unit)**	215.37
M	Increase in value of processed product over raw tomato (Rs)	10,90,954
N	% increase in value of processed product over raw tomato	484.2946138

Cost of Potato Processing units (n=15)

S.N	Particulars	Cost (Rs)
	WORKING CAPITAL	
1	Potato	2179316.667
2	Other processing ingredients (including packing material)	139715.3333
3	Labour charge	279430.6667
4	Utilities (Power, water, fuel etc.)	139715.3333
5	Other expenses (GST, licence fee, storage charge, repair & maintenance, Advertisement etc.)	465395
A	**Total Working Capital**	3203573
	FIXED CAPITAL	
1	Machinery & equipment	442600
2	Land rent	51000
B.	**Total Fixed Capital**	493600
C.	**Total Capital Invested (A+B)**	3697173
	FINANCIAL ANALYSIS	
D.	**Cost of production per annum**	
1	Total recurring cost	3203573
2	Depreciation charge	26556
3	Interest on total capital invested @ 12 %	443660.76
	Total	3673789.76
E.	**Turnover**	6985766.667
1	Production (Q)	580.4833333
2	Rate (Rs/Q)	11933.33333
F	**Net Profit (E-D)**	3311976.907
G	Net Profit Ratio (D/E*100)	52.58964313
H	Rate of return (D/C*100)	99.3675373
I	**B:C ratio**	2.65
J	**Break Even Point (FC*100)/ (FC + Net Profit)**	
i	**Fixed Cost**	
1	Depreciation	26556
2	Rent	51000
3	Interest on total investment	1289351
4	40 % of salary	111772.2667
5	40 % of other expenses	186158
	Total Fixed cost	819147.0267
J	**BEP [FC*100/(FC+Profit)]**	20.96
K	**BEP at Price (Rs/Q)**	5841.23
L	**BEP at yield (Q/unit)**	338.9124
M	Increase in value of processed product over raw potato (Rs)	1132660.24
N	% increase in value of processed product over raw potato	51.97318303

Cost of Mushroom Processing units for 6 months (n=15)

S.N	Particulars	Cost (Rs/unit)
	WORKING CAPITAL	
1	Mushroom	14970000
2	Other processing ingredients (including packing material)	4878366.667
3	Labour charge	2387933.333
4	Utilities (Power, water, fuel etc.)	341133.3333
5	Other expenses (GST, licence fee, storage charge, repair & maintenance, Advertisement etc.)	969253.3333
A	**Total Working Capital**	235,46,687
	FIXED CAPITAL	
1	Machinery & equipment (6 months)	209500
2	Land rent (6 months)	20166.66667
B.	**Total Fixed Capital**	229666.6667
C.	**Total Capital Invested (A+B)**	237,76,353
	FINANCIAL ANALYSIS	
D.	**Cost of production per annum**	
1	Total recurring cost	235,46,687
2	Depreciation charge	15363.33333
3	Interest on total capital invested @ 12 %	28,53,162
	Total	264,15,212
E.	**Turnover**	341,13,333
1	Production (Q)	3668
2	Rate (Rs/Q)	9285.714286
F	**Net Profit (E-D)**	7698120.933
G	Net Profit Ratio (D/E*100)	77.43368888
H	Rate of return (D/C*100)	111.0986703
I	**B:C ratio**	1.39
J	**Break Even Point (FC*100)/ (FC + Net Profit)**	
i	**Fixed Cost**	
1	Depreciation	15363.33333
2	Rent (6 months)	20166.66667
3	Interest on total investment	28,53,162
4	40 % of salary	955173.3333
5	40 % of other expenses	387701.3333
	Total Fixed cost	4231567
J	**BEP [FC*100/(FC+Profit)]**	35.47089468
K	**BEP at Price (Rs/Q)**	7330.473
L	**BEP at yield (Q/unit)**	2991.504248
M	Increase in value of processed product over fresh mushroom (Rs)	-7271879.067(NI) 191,43,333 (GI)
N	% increase in value of processed product over fresh mushroom	-48.57634647 (NI) 1.278779782 (GI)

Cost of Maize Processing units (n=15)

S.N	Particulars	Cost (Rs/unit)
	WORKING CAPITAL	
1	Maize	19,24,877.33
2	Other processing ingredients (including packing material)	13,99,323.33
3	Labour charge	27,14,743.33
4	Utilities (Power, water, fuel etc.)	3,70,225.83
5	Other expenses (GST, licence fee, storage charge, repair & maintenance, Advertisement etc.)	34,31,787.5
A	**Total Working Capital**	98,40,957.33
	FIXED CAPITAL	
1	Machinery & equipment	3,16,667
2	Land rent	66133
B.	**Total Fixed Capital**	3,82,800
C.	**Total Capital Invested (A+B)**	102,23,757
	FINANCIAL ANALYSIS	
D.	**Cost of production per annum**	
1	Total recurring cost	98,40,957.33
2	Depreciation charge	19,000
3	Interest on total capital invested @ 12 %	12,26,851
	Total	110,86,808
E.	**Turnover**	1,72,19,333.33
1	Production (Q)	3722.68
2	Rate (Rs/Q)	6880.30
F	**Net Profit (E-D)**	61,32,525
G	Net Profit Ratio (D/E*100)	35.61
H	Rate of return (D/C*100)	108.44
I	**B:C ratio**	2.38
J	**Break Even Point (FC*100)/ (FC + Net Profit)**	
i	**Fixed Cost**	
1	Depreciation	19,000
2	Rent	66,133
3	Interest on total investment	12,26,851
4	40 % of salary	10,85,897.33
5	40 % of other expenses	13,72,715
	Total Fixed cost	37,70,597
J	**BEP [FC*100/(FC+Profit)]**	38.07
K	**BEP at Price (Rs/Q)**	11957.84
L	**BEP at yield (Q/unit)**	3450.26
M	Increase in value of processed product over raw maize (Rs)	42,07,648
N	% increase in value of processed product over raw maize	218.59

Cost of Wheat Processing units (n=15)

S.N	Particulars	Cost (Rs/unit)
	WORKING CAPITAL	
1	Wheat	224012666.7
2	Other processing ingredients (including packing material)	8007840
3	Labour charge	96094080
4	Utilities (Power, water, fuel etc.)	56054880
5	Other expenses (GST, licence fee, storage charge, repair & maintenance, Advertisement etc.)	113148493.3
A	**Total Working Capital**	4973,17,960
	FIXED CAPITAL	
1	Machinery & equipment	64,50,000
2	Land rent	1,58,667
B.	**Total Fixed Capital**	66,08,667
C.	**Total Capital Invested (A+B)**	5039,26,627
	FINANCIAL ANALYSIS	
D.	**Cost of production per annum**	5581,76,155
1	Total recurring cost	4973,17,960
2	Depreciation charge	3,87,000
3	Interest on total capital invested @ 12 %	604,71,195
	Total	
E.	**Turnover**	8007,84,000
1	Production (Q)	1,31,600
2	Rate (Rs/Kg)	86
F	**Net Profit (E-D)**	2426,07,845
G	Net Profit Ratio (D/E*100)	69.70370976
H	Rate of return (D/C*100)	110.7653626
I	**B:C ratio**	1.592641
J	**Break Even Point (FC*100)/ (FC + Net Profit)**	
i	**Fixed Cost**	
1	Depreciation	3,87,000
2	Rent	1,58,667
3	Interest on total investment	604,71,195
4	40 % of salary	38437632
5	40 % of other expenses	45259397.33
	Total Fixed cost	1447,13,891
J	**BEP [FC*100/(FC+Profit)]**	37.36270851
K	**BEP at Price (Rs/Q)**	6676.747
L	**BEP at yield (Q/unit)**	126871.1
M	Increase in value of processed product over raw maize (Rs)	185,95,178
N	% increase in value of processed product over raw maize	8.300949411

Cost of Soybean Processing units (n=15)

S. N	Particulars	Cost (Rs/unit)
	WORKING CAPITAL	
1	Soybean & DOC	416810933.3
2	Other processing ingredients (including packing material)	6781624
3	Labour charge	34049018.67
4	Utilities (Power, water, fuel etc.)	14620554.67
5	Other expenses (GST, licence fee, storage charge, repair & maintenance, Advertisement etc.)	46771650.67
A	**Total Working Capital**	21930832
	FIXED CAPITAL	
1	Machinery & equipment	92,14,000
2	Land rent	1,65,333
B.	**Total Fixed Capital**	93,79,333
C.	**Total Capital Invested (A+B)**	5284,13,115
	FINANCIAL ANALYSIS	
D.	**Cost of production per annum**	
1	Total recurring cost	21930832
2	Depreciation charge	5,52,840
3	Interest on total capital invested @ 12 %	634,09,574
	Total	5829,96,195
E.	**Turnover**	731027733.3
1	Production (Q)	719063.4667
2	Rate (Rs/Q)	9243.333333
F	**Net Profit (E-D)**	61,32,525
G	Net Profit Ratio (D/E*100)	79.75021583
H	Rate of return (D/C*100)	110.3296226
I	**B:C ratio**	1.58
J	**Break Even Point (FC*100)/ (FC + Net Profit)**	
i	**Fixed Cost**	
1	Depreciation	5,52,840
2	Rent	1,65,333
3	Interest on total investment	634,09,574
4	40 % of salary	13619607.47
5	40 % of other expenses	18708660.27
	Total Fixed cost	96456015
J	**BEP [FC*100/(FC+Profit)]**	39.45232124
K	**BEP at Price (Rs/Q)**	3731.711
L	**BEP at yield (Q/unit)**	56846.15
M	Increase in value of processed product over raw maize (Rs)	-2687,79,395 (NI) 1661,85,262 (GI)
N	% increase in value of processed product over raw maize	-64.48472763 (NI) 39.87065801 (GI)

ANNEXURE III

Standardized scale to identify the training needs of agripreneurs for value chain development

S.N	**Statements**	**t value**
A	**Marketing Dimension**	
I.	**Product**	
1.	Selection of agricultural commodities	1.90
2.	Designing or planning of types of value added products that can be developed	3.84
3.	No need of training to determining features of value added product i.e. size, quality, appearance etc.*	2.56
4.	Technology used in processing and packaging value added products	1.92
5.	Determining branding of value added products	2.18
6.	Deciding nutritional value of products and using natural ingredients	2.19
II.	**Pricing**	
7.	No need for training to estimate cost of value added products*	2.88
8.	Pricing of products and fixing discounts on it	3.76
9.	Identifying price differences among target customer groups	2.16
10.	Determining the competition for the products	1.94
III.	**Place**	
11.	No need of training to identify enterprise opportunities and its premises*	2.47
12.	No need of training to identify distribution of product through direct selling or intermediaries involvement*	1.94
13.	No need of training to determine potential customer, point and volume of sale*	2.61
IV.	**Promotion**	
14.	Strategies for promotion i.e. free sample, coupon, contests, incentives, loyalty programmes	2.10
15.	No need of training for online purchasing facility of value added products*	3.39
B	**Technical Dimension**	**t value**
I	**Inputs**	

1.	Determining sources, price trends, demand and supply of critical raw materials	2.06
2.	No need of awareness about international/national standards, regulations and laws of agricultural technology*	2.01
3.	No need of training to use appropriate and modern technology for processing*	1.79
4.	No need of training for developing innovative value added products or services*	2.68
II	**Infrastructure**	
5.	No need of training to determine cost effectiveness of storage capacity*	2.2
6.	No need of training for estimating cost effectiveness of cold chain facility*	2.02
III	**Finance**	
7.	Effective financial planning including balance sheet etc	2.74
8.	Forecasting the need for additional capital for agri-enterprise	2.14
9.	Identifying appropriate sources for credits availability*	1.90
IV	**Legal**	
10.	Registration of agri-enterprise	3.16
11.	No need of training to obtained appropriate licenses*	2.86
12.	Knowing different food quality and safety standards	3.0
V	**Managerial**	
13.	Need of training for enhancing decisions making skills	2.07
14.	Need for exposure for networking skills	1.96
S. No	**Information**	**t value**
1.	Information and support for agri-start-up, its expansion and diversification	2.39
2.	Marketing information such as prices, flow of products, food processing units etc.	2.31
3.	Information regarding new technology from government etc.	2.27
4.	No need of information regarding post-harvest management of agricultural produce*	1.92
5.	No need of training for searching and utilising data from patent information, innovation information and other sources of knowledge*	2.09
6.	Understanding of the different ethical issues that exist in relation to	1.98

	enterprise and its utilisation	
D	**Social Responsibility**	**t value**
I	**Towards Employees**	
1.	No need of training to provide conducive working environment for work culture*	3.20
II	**Towards creditor/ banker**	
2.	Effective utilization of funds and resources	2.10
III	**Towards community**	
3.	No need of training for prevention of environmental pollution*	1.78
4.	No need of training to reducing deleterious effects of industrial products on human health*	2.02
IV	**Towards Government**	
5.	To comply with government rules, procedures and legal requirements	2.92

*means negative statements

Table 4: A list of statements towards training needs of agripreneurs involve in processing for value chain development with their respective "I-CVI"

S.No.	Statements	Agreement	I-CVI*
1	Designing or planning of types of value added products that can be developed	6	1
2	Pricing of products and fixing discounts on it	6	1
3	No need of training for online purchasing facility of value added products	6	1
4	No need of training to provide conducive work culture	6	1
5	Training need for registration of enterprise	5	0.833
6	Knowing food quality and safety standards	6	1
7	To comply with government rules, procedures and legal requirements	6	1
8	No need for training to estimate cost of value added products	6	1
9	No need of training to obtained appropriate licenses	5	0.833
10	Effective financial Planning	6	1

11	No need of training for developing innovative value added products or services	6	1
12	No need of training to determine potential customer, point and volume of sale	5	0.833
13	No need of training to determining features of value added product i.e. size, quality, appearance etc.	6	1
14	No need of training to identify enterprise opportunities and its premises	6	1
15	Information and support for agri-start-up, its expansion and diversification	5	0.833
16	Marketing information such as prices, flow of products, food processing units etc.	5	0.833
17	Information regarding new technology from government etc.	6	1
18	No need of training to determine cost effectiveness of storage capacity	5	0.833
19	Deciding nutritional value of products and using natural ingredients	5	0.833
20	Determining branding of value added products	6	1
21	Identifying price differences among target customer groups	6	1
22	Forecasting the need for additional capital for agri-enterprise	6	1
23	Effective utilization of funds and resources	5	0.833
24	Strategies for promotion i.e. free sample, coupon, contests, incentives, loyalty programmes	5	0.833
25	No need of training for searching and utilising data from patent information, innovation information and other sources of knowledge	6	1
26	Need of training for enhancing decisions making skills	5	0.833
27	Determining sources, price trends, demand and supply of critical raw materials	5	0.833
28	No need of training to reducing deleterious effects of industrial products on human health	5	0.833

29	No need of training for estimating cost effectiveness of cold chain facility	6	1
30	No need of awareness about international/national standards, regulations and laws of agricultural technology	5	0.833
31	Understanding of the different ethical issues that exist in relation to enterprise and its utilisation	6	1
32	Need for exposure for networking skills	6	1
33	Determining the competition for the products	5	0.833
34	No need of training to identify distribution of product through direct selling or intermediaries involvement	6	1
35	Technology used in processing and packaging value added products	6	1
36	No need of information regarding post-harvest management of agricultural produce	6	1
37	No need of Identifying appropriate sources for credits availability	5	0.833
38	Selection of agricultural commodities	6	1
39	No need for training in using appropriate and modern technology for processing	5	0.833
40	No need of training for prevention of environmental pollution	6	1
	S-CVI/Ave		0.930

*I-CVI means content validity index for each item

ANNEXURE IV

Interview Schedule for Processors

Name of the main crop referred for the survey (Food grains: Durum Wheat, Maize and Soybean; Fruits: Mango, Guava & Aonla & Vegetables: Tomato, Potato & Mushroom)

A) General Information

1. Name of the respondent:…….
2. Age: ……
3. Village:……..
4. Block:……..
5. District:……
6. Sex: Male / female
7. Level of Education:

a. Illiterate	
b. Functional literate	
c. Primary School	
d. High School	
e. Higher Secondary	
f. Graduate and above	

8. Family Size: ……..
9. Experience: …….
10. Land holding: ……
11. Number of training received: …….
12. : Source of Information…….

S.N	Source of Information	Frequency of seeking information		
		Frequently	Occasionally	Rarely
A	**Personal Localite**			
1	Friends			
2	Relative			
3	Progressive Farmers			
B	**Personal Cosmopolite**			
1	ADO			
2	Extension Agents			
3	Bank officers			
C	**Impersonal Cosmopolite**			
1	Radio			
2	TV			
3	Newspaper			
4	KCC			
5	Mobile based SMS			
6	Leaflet, folder, bulletins			
D	**Institutional Sources**			
1	KVK			

2	IARI (RS)			
3	ICAR Instt			
4	SAUs			
5	Others			
E	**Private Sources**			
1	Input Dealers			
2	NGOs			
3	Retailers			
4	Others			

B) Entrepreneurial Behaviour: Measurement of entrepreneurial characteristics of both processors and farmers on seven point continuum i.e. extremely agree, quite agree, slightly agree, undecided, slightly disagree, quite disagree and extremely disagree.

1. What do you think about risk associated to your enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	I don't fear investing my money on a venture whose dividends I have calculated							
2	I will consider a risk worth taking if probability for success is 40 to 60 %							
3	I don't mind working under conditions of uncertainty as long as there is a reasonable probability of gains from it to me							
4	I will consider a risk worth taking only if probability for success is 60 to 100 %							
5	I don't care if profit is small so long as it assured and constant							

2. What do you think, one strive hard to get success in his/her enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	Is being comfortable more important to you than getting ahead?							
2	Are you satisfied to be no better than most other people at your job							
3	Do you like to make improvements to the way the organization you belong to functions							
4	Do you take trouble to cultivate people who may be useful to you in your career							
5	Do you get restless and annoyed when you feel you are wasting time							
6	Have you always worked hard in order							

	to be among the best in your own line							
7	Would you prefer to work with a congenial but incompetent partner rather than with a difficult but highly competent one							
8	Do you tend to plan ahead for your job or career							
9	Is "getting on in life" important to you							
10	Are you an ambitious person							
11	Are you inclined to read of the successes of other rather than do the work of making yourself a success							
12	Would you describe yourself as being lazy							
13	Will days often go by without your having done a thing							
14	Are you inclined to take life as it comes without much planning							

3. How do you visualize success in your enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	I believe problems and barriers can be turned into opportunity that can be exploited							
2	I am prepared for the outcome of my actions							
3	I don't think of negative consequences of decisions that I made							
4	I cannot see the future as bright and promising							
5	I meet and solve problems as they arise							

4. What is your opinion, one should do task in a unique way?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	While my product/ services may not entirely be new, I am thinking of new and better ways to make it competitive							
2	While others see nothing unusual in the surrounding, I am able to perceive in it new opportunities for business							
3	I avoid changing the things as they are done							
4	I have never tried introducing new product to the market and I do not want to try							
5	The way things are done is the best							

	way to do the things							

5. What do you think; one should follow scientific approach in work?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	New methods of farming/processing gives better results than the old methods.							
2	The way of farming/processing by our forefathers is still the best way to carryout							
3	Though it takes time for a framer/processor to learn new methods of farming/processing; it is worthwhile the efforts							
4	A good farmer/ processor experiment with new idea in farming/processing.							
5	Traditional methods of farming/processing have to be changed in order to have competitive advantage							

6. One should be able to influence other for the task to be done; what do you feel?

S.N	Statement	EA	QA	SA	UD	SDA	QDA	EDA
1	I don‘t get discouraged by an initial ‘No’ from a buyer because I am usually able to convince him inevitable to my product.							
2	I am able to stimulate and direct others							
3	I find it hard to beg, that is to ask favour from other people							
4	I have difficulties in obtaining loans from people.							
5	It is not so easy for me to get people to do what I want them to do.							

7. One should be resilient in adverse situation also, what is your opinion?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	I can get through difficult times because I have experienced difficulty before							
2	In an emergency, I am someone to whom people can rely on							
3	When I am in a difficult situation, I can usually find my way out of it							
4	I can withstand extreme stress							
5	I think I will succeed in my enterprise irrespective of social and economical							

	condition							

8. A person should make his own decision in enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	Others control my decision taking							
2	Others tell me when to start and when to wind up the work							
3	I have control over the resources required to run my enterprise							
4	Others tell me what I am supposed to do							
5	Others tell me when and how I have to do my work							

9. A person should not be deviated by external stimuli, what do you feel?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	Many times I feel that I have little influence over the things that happen to me.							
2	Becoming a success is a matter of hard work, luck has little or nothing to do with it							
3	When I make plans, I am almost certain that I can make them work							
4	In my case getting what I want has little or nothing to do with luck							
5	By taking an active part in political and social affairs the people can control world events							
6	Most misfortunes are the result of lack of ability, ignorance, laziness, or all three							
7	Most misfortunes are the result of lack of ability, ignorance, laziness, or all three							
8	I often found that what is going to happen will happen.							
9	In the long run the bad things that happen to us are balanced by the good ones							
10	Heredity plays the major role in determining one's personality							

10. A person should always prepare for another task after achieving one, what do you think?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	After attaining a goal, I look for another, more challenging one.							
2	I like challenges and beating the odds							
3	I visualize my dreams and try to achieve them							
4	Despite numerous setbacks, I usually succeed in getting what I want							
5	I turn obstacles into positive experiences.							

11. What do you think, a person should be confident enough to deal with unpredicted situation?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	I can always manage to solve difficult problems if I try hard enough.							
2	If someone opposes me, I can find the means and ways to get what I want.							
3	It is easy for me to stick to my aims and accomplish my goals							
4	I can remain calm when facing difficulties because I can rely on my coping abilities.							
5	If I am in trouble, I can usually think of a solution							
6	I am confident that I could deal efficiently with unexpected events							

12. What is your opinion regarding creativity in enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	Creativity is a regular part of how I performed my responsibilities							
2	I am receptive to ideas that challenge my way of thinking							
3	Time restraints are not a problem for me in being creative in work							
4	I regularly take time to learn and implement techniques creativity							
5	I am receptive to team creativity, even if rewards are shared equally between all team members							
6	I have knowledge of the areas that require me to be creative							

7	I consistently take my ideas from conception to application							
8	I am not limited by my position with respect to implementing creative ideas							
9	I am aware of my unique way of being creative and I use it on regular basis							

13. Do you think you manage enterprise in planned way?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	I find nothing wrong in consulting expert regarding how I must manage my business							
2	As an entrepreneur I need to practice basic managerial skills, so that my business need not to be a one man show for a concerted effort of myself and those who work for me							
3	It is not necessary to be scientific and rational in labour management as long as has the will to do what he wants to do							
4	I cannot be away too long from my business because no one else but I can manage its activities							
5	I believe the sole proprietorship is the best form of ownership for a business to succeed							

14. Do you critically think before doing any task in enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	I accomplish most when I am alone, under no direct supervision of any one							
2	I tend to overestimate my capabilities for succeeding in any venture							
3	I doubt my ability to cope under new untested condition							
4	I find difficulty in asserting myself against the opinion of majority							
5	Even if I am capable of hardworking and ambitious, if I do not have the money, I cannot start a business							

15. Do you think a person should be inquisitive to run enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	I like exploring strange ideas							
2	I enjoy intellectual talk							
3	I will not probe deeply into a subject							
4	I avoid discussions on topics I have no idea about							
5	I am interested in science							
6	I seek explanation for everything before taking a decision							

16. What do you think about persistency in enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	I don't allow failures to discourage me							
2	Once I have started a task I usually carry it to its completion							
3	I find myself working harder under stress							
4	I work just as hard as most people I know							
5	When I fail in a goal, I immediately turn my attention to another goal							

17. How do you see about the opinion of others in enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	I don't get upset when negative feedback is given about the way I perform							
2	I try to know more about the life stories of successful businessmen							
3	Mistakes and failures overwhelm me so much that I cannot learn from them							
4	I am unwilling to change my mind, once it is made up even in the face of new development							
5	I find no reason to consult other people about how to run my business better because I am satisfied with the way I run it							

18. Please tell about your knowledge in enterprise?

S.N	Statements	EA	QA	SA	UD	SDA	QDA	EDA
1	The knowledge, experience and training I have on my business is good							

	enough							
2	My competence is better than that of the ordinary man in my community							
3	I want to have good knowledge of my market before I start my business							
4	I need not waste time and money on "market research", If the product sells, I will go on producing							
5	I don't see the importance of reading the newspaper every day							

C. Entrepreneurial Environment Variables

1: Strongly Agree, 2: Agree; 3: Uncertain; 4: Disagree; 5: Strongly Disagree

1. Institutional Variables

S.N	Factors	SA	A	UD	DA	SDA
A. Governmental Factors						
1	Institution helps in providing motivational training					
2	Institution provides guidance in selecting project					
3	Any help in provision of information about processing					
4	Institution provides resources					
5	Institutions helping to keep prescribe standards					
6	Institutions are helping in diversification or expansion of enterprise					
7	Provision of market intelligence by institution					
B. Political Factors						
8	Influence of any political party					
9	Policy related to VCD to promote entrepreneurship					
10	Giving equal importance to all section of people during policy implementation					
C. Educational Factors						
11	Facility of entrepreneurial education in school/ college					
12	Facility of training related to entrepreneurship					
13	Workshop organized on entrepreneurship					
D. Family Factors						
14	Ancestors set the enterprise					
15	Supportive Family					
16	Other family members are involve/ working in Enterprise					
E. Religious Factor						
17	Religious belief you have regarding choice of enterprise					
18	Any prominent caste preferring for entrepreneurship					

	in society					

2. Marketability Variables

S.N	Statements	SA	A	UD	DA	SDA
1	Always implementing new marketing strategies					
2	Prefer products which has high demand					
3	Getting assured price for the products					
4	Availability of marketing information and intelligence					
5	Existence of middlemen					
6	Nearby marketing facility available					

3. Financial Variables

S.N	Statements	SA	A	UD	DA	SDA
1	Timely availability of credits					
2	Smoothly getting loan					
3	Timely provision for subsidy					
4	Availing Insurance					
5	Developing financial planning i.e. balance sheet					

4. Technical Variables

S.N	Statements	SA	A	UD	DA	SDA
1	Availability of raw materials on time					
2	Availability of suitable varieties of crops for processing					
3	Availability of technical information					
4	Adequate extension support					
5	Timely availability of skilled labour					

5. Infrastructure Variable

S.N	Statements	SA	A	UD	DA	SDA
1	Uninterrupted power supply and water					
2	Availability of suitable machinery and specifications					
3	Availability of transportation					
4	Availability of sufficient storage facilities/ cold chain					
5	Facility for repairing and maintenance of machinery etc.					

6. Legal Variable

S.N	Statements	SA	A	UD	DA	SDA
1	Facing problem while registration of agri-enterprise					
2	Difficulty in obtaining licences					

3	Awareness regarding food quality and safety standards					
4	Ease in registering GST and its payment					

D. Value Chain Mapping

1. **Turnover:**

Crops	Type of Products	Quantity (Tons/yr)	Selling Price (Rs/q)	Recovery rate of main product (%)
Durum Wheat				
Maize				
Soybean				
Potato				
Tomato				
Mushroom				
Mango				
Guava				
Aonla				

2. **Cost of production**

(A). Working Cost (Rs/year):

a. Raw material: a) quantity……. b) cost……
b. Other ingredients cost: ……
c. Packing cost: ……
d. Labour cost: a) number……b) salary……
e. Utilities cost: a) Power ……b) Water ……c) Fuel…....
f. Other expenses:
   i. Storage ……..
   ii. Transportation cost…….
   iii. Advertisement cost……..
   iv. Machine repair and maintenance……
   v. GST rate: …….
   vi. Grading charge: ……
   vii. Miscellaneous charge:…….

(B). Fixed costs (Rs/year):

a. Machinery and equipment cost: ……
b. Land rent: ……
c. Rent for building/premise: ……..
d. Others: ……..

3. **Net price received** (Rs/ qtl): Turnover (Rs/year) – Cost of production (Rs/year)
4. **Marketing costs** (Rs/qt):

a) Storage charges: ……..
b) Transportation charges: …….
c) Hamali charges : ……
d) Other costs involved: ……..
   i. Weighing charges: ……
   ii. Commission charges: ……
   iii. Market fee: ……
   iv. Packing (Rs/ kg): ……..
   v. License fee: ……..
   vi. Any other (specify): …….

5. From where do you get the Agricultural commodities for processing?

Name of supplies	Place	Quantity (ton/ year)	Average buying price (Rs/ton)
Farmers			
Merchant			
Wholesaler			
Agents			
Others			

6. Quantity of processed main products supplied to different users:

users	Place	Quantity (ton/year)	Average price (Rs/kg)
Wholesale market			
Retailer			
Supermarket			
Consumers			
Others (specify)			

7. Marketed and marketable surplus
   a) Production (Q/ Ha): …….
   b) Consumption/ Own use (Q/ Ha): …….
   c) Retained for future use (Q/Ha): ……
   d) Losses (Q/Ha): ……..
   e) Wage paid in kind (Q/ Ha): ……..
   f) On season sale (Q/Ha): ……
   g) Off season (Q/Ha): ……..

8. Which institutions are much important and how far they are:

S. No.	Institutions	Importance (rank)	Distance	Remark
1	Marketing: Wholesaler			

	Retail			
2	Input: Raw material Electricity office			
3	Finance: Bank Cooperatives others			
4	Family: Own Family member Relatives Others			
5	Legal aspects: Insurance company Sales Tax office Registration centre Quality and safety standards centre Pollution control agency			
6	Supporting Institutions: KVK ICAR RS SAU EEI Training centre			

E. "Identifying Training Needs of Entrepreneurs for enhancing their competency in value chain development"

S.N	**Statements**	SA	A	UD	DA	SDA
A	**Marketing Dimension**					
I.	**Product**					
1.	Selection of agricultural commodities					
2.	Designing or planning of types of value added products that can be developed					
3.	No need of training to determining features of value added product i.e. size, quality, appearance etc.*					
4.	Technology used in processing and packaging value added products					
5.	Determining branding of value added products					
6.	Deciding nutritional value of products and using natural ingredients					
II.	**Pricing**					
7.	No need for training to estimate cost of value added products*					
8.	Pricing of products and fixing discounts on it					
9.	Identifying price differences among target customer groups					

10.	Determining the competition for the products					
III.	**Place**					
11.	No need of training to identify enterprise opportunities and its premises*					
12.	No need of training to identify distribution of product through direct selling or intermediaries involvement*					
13.	No need of training to determine potential customers as well as point and volume of sale*					
IV.	**Promotion**					
14.	Strategies for promotion i.e. free sample, coupon, contests, incentives, loyalty programmes					
15.	No need of training for online purchasing facility of value added products*					

B	**Technical Dimension**	SA	A	UD	DA	SDA
I	**Inputs**					
16.	Determining sources, price trends, demand and supply of critical raw materials					
17.	No need of awareness about international/national standards, regulations and laws of agricultural technology*					
18.	No need of training to use appropriate and modern technology for processing*					
19.	No need of training for developing innovative value added products or services*					
II	**Infrastructure**					
20.	No need of training to determine cost effectiveness of storage capacity*					
21.	No need of training for estimating cost effectiveness of cold chain facility*					
III	**Finance**					
22.	Effective financial planning including balance sheet, profit and loss statements etc.					
23.	Forecasting the need for additional capital for agri-enterprise					
24.	No need of training to identify the credits availability, sources, types and rules as well as procedures to avail it*					
IV	**Legal**					
25.	Registration of agri-enterprise					
26.	No need of training to obtained appropriate licenses*					
27.	Knowing different food quality and safety standards					
V	**Managerial**					
28.	Need of training for enhancing decisions making skills					
29.	Need for exposure for networking skills					

S.N	**Information**	SA	A	UD	DA	SDA

30.	Information and support for agri-start-up, its expansion and diversification					
31.	Marketing information about prices, flow of products, food processing units etc.					
32.	Need of information regarding new technology from governments etc.					
33.	No need of information regarding post-harvest management of agricultural produce*					
34.	No need of training for searching and utilising data from patent information, innovation information and other sources of knowledge*					
35.	Understanding of the different ethical issues that exists in relation to enterprise and its utilisation					

D	**Social Responsibility**	SA	A	UD	DA	SDA
36.	No need of training to provide conducive working environment for work culture*					
37.	Effective utilization of funds and resources					
38.	No need of training for prevention of environmental pollution*					
39.	No need of training to reducing deleterious effects of industrial products on human health*					
40.	To comply with government rules, procedures and legal requirements					

F. Constraints perceived by Processors

1. What are the driving forces that promote processing in your locality?

S.N	Statements	SA	A	UD	DA	SDA
A. Technical Forces						
1.	Adequacy of raw material					
2.	Availability of suitable variety of raw material					
3.	Timely availability of skilled labour					
4.	Access to technical information					
5.	Access to technology related to value addition					
B. Infrastructure Forces						
1.	Availability of logistic facility					
2.	Access to institutional support					
3.	Packaging facility available					
4.	Access to repair and maintenance of machinery					
5.	Availability of grading facility					
C. Marketing Forces						
1.	Direct marketing facility available (forward)					
2.	Facility of direct raw material availability from producer					
3.	Knowledge about online marketing strategy					
4.	Access to market information					

5.	Awareness of distance selling of products					
D. Financial Forces						
1.	Bank availability nearby					
2.	Ease in obtaining loan					
3.	Good insurance facility					
4.	Awareness about government price policy					
5.	Special credit facility to weaker section of society					
E. Legal Forces						
1.	Ease in registration of enterprise					
2.	Awareness about food quality and safety standards					
3.	Smoothen in registering GST					
4.	GST brought transparency in trading					
5.	Demonetization promoted digital payment					
F. Socio-personal Forces						
1.	Provision of courses on food processing and technology					
2.	Strong internal locus of control					
3.	Getting family support					
4.	Moderate risk taking ability					
5.	Good decision maker & innovativeness					

2. What are the restraining forces that inhibit processing in your locality

S.N	Statements	SA	A	UD	DA	SDA
A. Technical Forces						
1.	Lack of affordability of machines					
2.	Lack of training programmes nearby					
3.	Poor support for diversification of enterprise					
4.	Poor follow-up by training centres					
5.	Lack of knowledge about packaging of products					
B. Infrastructure Forces						
1.	Transportation bottleneck					
2.	Interrupted power supply					
3.	Unavailability of storage facility					
4.	Lack of machinery availability nearby					
5.	High machinery cost					
C. Marketing Forces						
1.	Fluctuating Price of raw material					
2.	Difficulty in predicting demand and price of products					
3.	Distress sale of products					
4.	Existence of middleman					
5.	Problem in negotiating contracts					
D. Financial Forces						
1.	Difficulty in obtaining subsidy					
2.	High rate of interest for credits					
3.	Lack of supporting price policy					
4.	Long payback period in investment					
5.	Lack of information about credit facility					

E. Legal Forces						
1.	Difficulty in getting license					
2.	Problem in getting insurance					
3.	High GST rate on value added products					
4.	Demonetization affected on turnover					
5.	Demonetization affected daily wage payment to labours					
F. Socio-personal Forces						
1.	Lack of entrepreneurial education					
2.	Differences based on caste etc.					
3.	Political pressure					
4.	Poor motivation					
5.	Negative attitude of society					

ANNEXURE V

Interview Schedule for Farmers

Name of the main crop referred for the survey (Food grains: Durum Wheat, Maize and Soybean; Fruits: Mango, Guava & Aonla & Vegetables: Tomato, Potato & Mushroom)

1. Name of the respondent: ……..

2. Village: …… Taluk: …… Ph. No: ……

3. Age: …… 4. Types of Family: (nuclear / joint)

5. Level of Education:

Illiterate	
Functional literate	
Primary School	
High School	
Higher Secondary	
Graduate	
Post Graduate and above	

6. Land holding (ha): ……\
7. Family size: .....
8. Number of training received: ……
9. Source of information

S.N	Source of Information	Frequency of seeking information		
		Frequently	Occasionally	Rarely
A	**Personal Localite**			
1	Friends			
2	Relative			
3	Progressive Farmers			
B	**Personal Cosmopolite**			
1	ADO			
2	Extension Agents			
3	Bank officers			
C	**Impersonal Cosmopolite**			
1	Radio			
2	TV			
3	Newspaper			
4	KCC			
5	Mobile based SMS			
6	Leaflet, folder, bulletins			

D	**Institutional Sources**			
1	KVK			
2	IARI (RS)			
3	ICAR Instt			
4	SAUs			
5	Others			
E	**Private Sources**			
1	Input Dealers			
2	NGOs			
3	Retailers			
4	Others			

10. Cost of cultivation of selected agricultural commodity

a) Labour cost

S.N	Operation	Human labour		Bullock labour		Machine		Remarks
		No	Wage rate	Qnt.	Wage rate	No of hours	Rs/hr	
1	Land Preparation a. Ploughing b. Cold crushing c. Spreading of FYM d. Harrowing e. Others							
2	Sowing							
3	Fertilizer Application							
4	Weeding							
5	Inter-cultivation							
6	Irrigation							
7	Plant protection							
8	Harvesting							
9	Threshing & Bagging							
10	Others							
Total								

b)Input cost:

S.N	Item	Quantity		Unit Price (Rs)	Total Price (Rs)	Remarks
		Owned	Purchased			
1	Seed					
2	Fertilizer i ii iii					

3	FYM					
4	Plant protection chemicals i ii iii					
5	Weedicides					
6	Irrigation charge					
7	Others					
b) Interest on working Capital Total Operational Costs (a+b+c)						
c) Fixed Costs 1. Land Revenue 2. Rent for building/premise: 3. Depreciation: 4. Interest on fixed Capital 5. Others						
Total cultivation costs (a+b+c+d):						

11. Profitability of selected crops

Name of crop (1)	Cost of cultivation per hectare (2)	Yield per hectare (Q) (3)	Price per quintal (Rs) (4)	Gross Return per hectare (5)	Net Return Per hectare (6)	B:C Ratio (6/2)
Wheat						
Maize						
Soybean						
Mango						
Guava						
Aonla						
Potato						
Tomato						
Mushroor						

12. Marketing costs

Particulars	Cost in Rupees / Qtl	Remarks
a) Bagging		
b) Transportation		
c) Hamali (labour) expenses		
d) Market fee		
e) Weighing Charge		
f) Commission Agent's fee		
g) others		
Total marketing costs		

13. Marketing Channel

a) Types of Marketing Channel

S. No	Marketing Channel	Quantity (Qtl)	Price (Rs/qtl)	Remark
1	Producer--- Wholesaler---- consumer			
2	Producer--- Retailer---- consumer			
3	Producer--- Commission agent---- Wholesaler---- consumer			
4	Producer--- Processor---- consumer			
5	Producer--- consumer			
6	Others (Specify)			

b) Reason for the sale of produce in a particular marketing channel

S. No.	Reasons	Yes	No
1	Provide credit facility		
2	Proximity		
3	Less margins		
4	Service rendered by them		
5	Getting storage and transport facility by them		
6	Spot payment		
7	Remunerative price		
8	Others (Specify)		

14. Marketed and marketable surplus

h) Production (Q/ Ha): …….
i) Consumption/ Own use (Q/ Ha): …….
j) Retained for future use (Q/Ha): ……
k) Losses (Q/Ha): ……..
l) Wage paid in kind (Q/ Ha): ……..
m) On season sale (Q/Ha): ……
n) Off season (Q/Ha): ……..

15. Constraints perceived by Producers

1. What are the driving forces that promote processing in your locality?

S.N	Statements	SA	A	UD	DA	SDA
	Production Forces					
1.	Awareness about package of practices					
2.	Timely availability of input					
3.	Availability of skilled labour					
4.	Quality seed availability					

5.	Access to required farm implements					
	Technical Forces					
6.	Local and regular availability of raw material					
7.	Reasonable prices of raw material					
8.	Timely labour availability					
9.	Training facility					
10.	Access to food science and technology course					
	Marketing Forces					
11.	Nearby marketing facility exists					
12.	Collective marketing facility					
13.	Getting remunerative price					
14.	Direct contact with processor (Contract farming)					
15	Getting assured MSP					
	Infrastructure Forces					
16.	Transport facility available					
17.	Storage facility available					
18.	Access to institutional support					
19.	Availability of grading facility					
20	Availability of packing facility					
	Financial Forces					
21.	Access to credit facility					
22.	Facility of crop insurance					
23.	Availability of subsidy					
24.	Availability of crop loan					
25.	KCC availability					
	Socio-personal Forces					
26.	Hardworking					
27.	Perseverance in nature					
28.	High group cohesiveness					
29.	Moderate risk taker					
30.	Family support					

2. What are the restraining forces that inhibit processing in your locality

S. N	Statements	SA	A	UD	DA	SDA
	Production Forces					
1.	Lack of access to new production technology					
2.	High cost of cultivation					
3.	Uncertainty of weather					
4.	Low awareness about post harvest management technique					
5.	Lack of exposure to farm visit, demonstration etc.					
	Technical Forces					
6.	Lack of awareness about processing technology					
7.	Poor support to agri-start up					
8.	Lack of information about registration					
9.	Lacking information of quality standards					

10.	Low access to entrepreneurial education					
	Marketing Forces					
11.	Existence of middleman					
12.	High price fluctuation					
13.	Distress sale					
14.	Getting low price during high yield					
15.	Unreasonable market fee					
	Financial Forces					
16.	Lack of awareness about credit facility					
17.	Difficult to obtain crop insurance					
18.	Obtaining subsidy is cumbersome process					
19.	Facing difficulty in obtaining loan					
20.	Delay in providing subsidy					
	Infrastructure Forces					
21.	High transportation cost					
22.	High storage cost					
23.	Lacking interest of institutional Personnel					
24	Lack of access to machinery					
25.	Interrupted power supply					
	Socio-personal Forces					
26.	Lack of innovativeness					
27.	External locus of control					
28.	Lack of marketing orientation					
29.	Perceiving processing as cumbersome process					
30.	Lack of economic motivation					

ANNEXURE VI

Interview Schedule for Middleman/ Retailers

Name of the main crop referred for the survey (Food grains: Durum Wheat, Maize and Soybean; Fruits: Mango, Guava & Aonla & Vegetables: Tomato, Potato & Mushroom)

1. Name: _____Village/town: _____

2. Block/taluk/mandal: _____ District /division: _____

3. Phone. No: _____

4. Address of shop: _____

5. Name and operation of market dealing by middleman/commission agent/broker:

6. Type of ownership: Individual/partnership / any other:

7. Which year did you start working as a middleman/ commission agent/broker/trader?

8. What major commodity do you generally deal as a middleman/commission agent/ broker/ trader? (a) ……. (b) ……. (c) ……

9. Place of buying: Market yard/ Villages / other

10. When do you contact farmers in these villages?

(a) Before crop season (b) Middle of the crop season

(c) Just before harvest (d) After harvest

11. What is your annual turnover (tons/year) _____ Value (Rs/year)_____

Crops	Products	Quantity	Purchasing Price (Rs/ Kg)	Selling Price (Rs/Kg)	From Whom	To Whom
Durum Wheat						
Maize						
Soybean						
Potato						
Tomato						
Mushroom						
Mango						
Guava						
Aonla						

12. Total Cost: (A+ B)

(A). Fixed costs (Rs/year):

a. Land Revenue
b. Rent for building/premise:
c. Depreciation:
d. Interest on fixed Capital
e. Others

(B). Variable costs (Rs/qt):

(a). Transportation (distance in kms) _____Amount (Rs/qt): _____

(b). Bagging (Rs/qt) _____

(c). Weighing charges _____

(d). Hamali (labor) expenses (Rs/qt) _____

(e). Market fee (%) _____

(f). Others (specify) _____

Total cost (Rs/qtl): _____

13. What are the most important constraints (problems) do you face in your business?

S. N	Constraints	Rank	Remarks
1	Low price for the produce at the time of harvest		
2	Non-payment/ untimely payment		
3	Lack of transportation		
4	Lack of storage facilities		
5	Lack of adequate processing units		
6	Too much price fluctuations		
7	Others (Specify)		

ANNEXURE VII

Interview Schedule for organization

1) Organization's characteristics
   a) Name: ……
   b) Started in: ……..
   c) Head of organization: ……..
   d) Position in organization: ……
   e) Years of service: ……..
   f) Organization or institution working for: …….
   g) Resources: ……
   h) Facilities available at the institution: …….
   i) Number of farmers served: …….
   j) On-going activities and services: ……
   k) Present area of operation: ……
2) lease rank the strategies which should be prefer to promote value chain among farmers

S.N	Strategies	Rank
1.	**Post harvest management Dimension**	
i.	Sensitizing the producer about post-harvest losses at individual as well as aggregate level	
ii.	Provide access to different post-harvest management techniques	
iii.	Provide information about several value addition process/ techniques	
2.	**Market Dimension**	
i.	Timely and regular availability of market intelligence	
ii.	Promote direct marketing facility at reasonable price (contract farming between farmers & processors)	
iii.	Provide online marketing support	
3.	**Infrastructure Dimension**	
i.	Provision of cold storage adequately and reasonably	
ii.	Facilitate collective processing and collective marketing	
iii.	Access to required machinery for value addition	

4.	**Institutional Dimension**	
i.	Provide training to promote value addition through KVK etc.	
ii.	Encourage district level processing centre	
iii.	Motivation and follow up support to farmers	
5.	**Information Dimension**	
i.	Single window delivery system along with toll free number for providing information to start up agripreneur	
ii.	Awareness among farmers related to various schemes started by government for promoting entrepreneurship and value addition	
iii.	Access to different credit facility availability to farmers	

3. Any other strategies that should be considered to promote value chain among farmers and upgrade among processors

……
……
……