Chapter 3

CONCEPTUAL FRAMEWORK

3.1 Introduction

The research is completely dedicated to get the deeper insight of the theoretical concepts associated with supply chain management with measuring the potential to get implemented with the concept of vertical coordination for the development of vegetable industry. Another view is to find an efficient and effective method to analyze the existing supply chain and redesign a beneficial supply chain to improve supply chain performances. This chapter supports the literature considering all the main theoretical concepts with the existing research. The main purpose of the chapter is to support this research with the discussion and presentation of the process of evolution in agribusiness research shifting from the choice to a vertically coordinated approach passing through the contractual agreement. The vertically coordinated approach deals with issues of uncertainty, transaction costs and frictions in agricultural trade. Vertically coordinated vegetable supply chain can contribute to the reduction of transaction cost studied as one very important postulate. The contribution towards the reduction of transaction problems among the stakeholders of the supply chain for institutions is also a matter for vertically coordinated vegetable supply chain. The transaction cost and collective action of participants of supply chain in vertically coordinated vegetable supply chain is the major concern. The cost of information search and establishing market relationships with continuous observation are also included in transaction costs. The magnitude of transaction cost depends upon the level of uncertainty and frequency of transactions. In the vertically coordinated system the concept of collective action has high impact on the development, arrangements and management of supply chain to reduce transaction costs. All hypotheses are formulated to measure the strength of relationship of constructs considering the vertically coordinated approach. Lastly the empirical evidences are discussed and presented including the mythological values and limitation with a snapshot of the conclusion.

The utmost importance for supply chain management is to lowering the cost with a better satisfaction for consumers stressed by many researchers (Ellram, 1991; Towill,
1996; Bechtel and Jayaram, 1997) and primary producer linkage with the final consumer with the systematic association with all the successive actors in the process can meet the objective of SCM. The excellence in the whole business process can be achieved by linking the successive members of the supply chain with each other and establishing a good relationship among them (Lambert et al. 1998). For a successful drive of the supply chain management the optimization of results rather to take with other organizations (Cooper et al., 1997a). The interdependency of each successive activity is very important for effectiveness of the SC by Stevens (1989). The model firstly presented by Forrester in 1961 that shows a factory – distributor – retailer system and how small problems in one part of the system can suddenly become big in other part and disturbs the whole supply chain. The organizations involved in production, process or distribution of vegetables are the members vegetable supply chain (Zuurbier et al., 1996).

Bechtel and Jayaram (1997) has a deep review on the supply chain management as a concept provides the other researchers opinion on this saying there is no agreement of definition available and sometimes the concept itself has been misused. The five different ways of establishment of supply chain presented by Hoogewegen (1997) as single organization, dyad referring to the relationship between two organizations, the seller’s supplier and/or the buyer’s customer, Industry level, and total network of organizations that participate in a specific part of the economy. There are different views presented by different literature where some shows it as single organization activity or dyad (Davis or Stevens) others refer to the SC level (Jones and Riley or Lee and Billington) or the network level of analysis (Beers et al., Ellram or Christopher). Different definitions given by different authors are the end to end solution starting from procurement from suppliers with planning and controlling of the flow of materials (Jones and Riley, 1985), all activities in a series related to planning, coordinating and controlling material in the whole process (Stevens, 1989), the chain linking each element of the production and supply process from raw materials through to the end consumer (Scott and Westbrook, 1991). With the development of time and addition to the literature by researchers some other definitions came as a network of firms interacting to deliver a product or service to the end customer linking flows from raw material supply to final delivery (Ellram, 1991), a system whose constituent parts include suppliers of materials, production facilities, distribution services and customers, all linked together via the feed forward flow of materials and the feedback
flow of information (Towill et al., 1992). The network of organizations that are involved through upstream and downstream linkages in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer (Christopher, 1992) as a network of processing cells with the following characteristics: supply, transformation and demand (Davis, 1993). The certain changes and variations in definitions are always contradictory like networks of facilities that procure raw materials transform them into intermediate goods and then final products and deliver the products to customers through a distribution system (Lee and Billington, 1995), material and information flows both in and between facilities such as vendors, manufacturing and assembly plants and distribution centers there are three traditional stages in the SC: procurement, production and distribution (Thomas and Griffin, 1996), the integration of business processes from end-user through original suppliers that provides products, services and information that add value for customers (Cooper et al., 1997a). The network of connected and interdependent organizations mutually and cooperatively working together to control, manage and improve the flow of materials and information from suppliers to end users (Christopher, 1998), a network of connected organizations aimed at the fulfillment of consumer needs in conjunction with the fulfillment of needs of other stakeholders of such an entity (Beers et al., 1998), a network of processes with precedence relationships that are linked by the flow of products, information and/or money (Trienekens, 1999). From the raw materials stage through to the end user as well as the associated information flow and materials flow up and down the SC (Handfield and Nichols, 1999), Supply chain is all that converts concepts into cash and customer satisfaction (Jim Ayer, 2000), Supply Chain encompasses all the activities associated with moving goods from the raw material stage through to the end-user (Peter C Brewer, 2000), a supply chain consists of all stages involved, directly or indirectly, in filling a customer request (Peter Meindl and Sunil Chopra, 2002), Supply chain is life cycle processes supporting physical, information, financial and knowledge flows for moving products and services from suppliers to end users (James Ayer, 2004). Further a few definitions has some specific criterion as a supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products to customers (Mohanty and Desmukh, 2005), Supply Chain is a process which connects all the links involved in the customer order...
fulfillment, viz., supplier, transporter, manufacturer, wholesaler, retailer, consumer and the business processes that bring products and services to the market place (B.S. Sahay, 2006).

**3.2 Need of the Conceptual Framework**

Vegetable supply chain systems are facing many difficulties due to changes in developing countries; mainly the small farmers are getting badly affected due to the lack of support. An analytical framework is needed to understand the problems and to develop the mechanism to overcome these challenges and to find opportunities for farmers provided by vertically coordinated vegetable supply chain systems. New Institutional Economics (NIE) approach is focused on evaluation of market flaws and talks about small farmer’s limitations for participation in vertically coordinated supply chains (Harris et al., 1995). The role of economic transactions in NIE has been discussed by Coase, North and Williamson as the origin (Menard, 2000). The mainstream economic theory emphasizes on the activities of economic agents like farmers who acts to control the cost. Though it is not the same always when comes on practical ground condition to the potential gains (Harris et al., 1998). One reason for act by farmers is due to their limitation and the fear to loss due to the frictions in trade (Harris et al., 1998; Williamson, 2000). Supermarkets growth in developing countries are getting more important and being the driving factor of poverty reduction and compelling towards the opportunity to development stated by Reardon and Berdegue (2002). Now the question arises why small farmers hesitate to participate in the structure of supermarket supply chains and get benefited with the potential opportunities? The new approach of vertically coordinated system is being more efficient than the traditional spot market. Supermarkets are also moving towards vertically coordinated approach to ensure the on time availability of vegetables by Singh, U. S. and Mishra, U.S. (2013); Singh, U. S., Mishra, U.S. and Mishra, B.B. (2014); Singh, U. S. and Mishra, U.S. (2015); and Singh, S. (2013). Small farmers are not aware with the vertically coordinated approach and opportunities available for them by Supermarkets. So, they are not shifting, continued with the existing traditional market structure. Hypotheses formulated are reasonable and well presented for the evaluation of theory.
The value chain framework provided by Porter in 1985 originates all the value added activities describing activities getting placed in an organization. The organization’s margin is calculated as the positive difference of value creation of activities with the incurred cost in execution. Customer willing to pay the amount for a product or service is the value and to increase value it needs some value addition activities called as primary and support activity. Porter defines primary activities as the activities involved in the physical creation of the product and its sales and transfer to the buyer as well as after-sale assistance. Support activities are defined as those that support the primary activities and each other by providing purchased inputs, technology, human resources and various firm-wide functions (Porter, 1985). The value chain of an organization is the system of dependent activities the execution of an activity impacts the costs or effectiveness of other activities. Porter’s argument is that the value chain may be used to identify and understand the specific sources of competitive advantage and how they relate to creating added value for customers.

![Porter Value Chain Diagram](image_url)

*Source: The value chain (Porter, 1985)*

**Fig. 3.1: Porter Value Chain**

Porter calls this the value system; it comprises the value chains of suppliers, customers and the organization itself (Stern et al., 1996). The value system is not a collection of independent activities but a system of interdependent activities. Suppliers do not only deliver a product but they can also influence a firm’s performance in many other ways. Many products pass through the value chains of suppliers and their suppliers (Porter
1985). Downey (1996) prefers the term system since this suggests an interactive and dynamic set of relationships acting in concert with one another. A SC starts with the end-consumer and works its way upstream via one actor in each industry level. The other actors in the network influence the performance of the SC. As Hakansson and Snehota (1995) state what happens between two companies does not solely depend on the two parties involved but on what is going on in a number of other relationships, Wilding (1998) calls this parallel interaction. Therefore the analysis of a SC should preferably take place or be evaluated within the context of the total network.

![Fig. 3.2: Schematic Diagram of a Generic Food SC (Shaded) In the Total Supply Network](image)

Vertical integration can be viewed as an alternative to SCM in that it attempts to manage and control channel efficiency through ownership. Ellram (1991) groups the advantages and respectively the disadvantages of vertical integration into three broad categories. Argyrus (1996) elaborates on the capabilities approach to the firm which postulates that firms vertically integrate activities for which they possess capabilities that are superior to those of the potential suppliers. According to Ellram (1991) the literature does not agree on when vertical integration will occur. Williamson (1985) developed a framework of three critical dimensions, these dimensions determine the way an organization should be structured in order to be most effective in bringing the firm’s products to market. These are (1) the uncertainty associated with the transaction (cost, timing and so on) (2) the degree to which specialized assets or investments is involved in the transaction, and (3) the frequency of the transactions.
Table 3.1: Advantages and disadvantages of vertical integration (Ellram, 1991)

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td><strong>Improves control:</strong></td>
<td><strong>Limits competition:</strong></td>
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<tr>
<td>- Reduction of uncertainty</td>
<td>- More difficult for non-integrated firms to enter business</td>
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<td>- Convergent expectations</td>
<td>- Weakens non-integrated competitors</td>
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<td>- Reduced probability of opportunism and externalities (e.g. dependency on monopoly suppliers)</td>
<td>- Inability to replicate market incentives</td>
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<td>- Ease of conflict resolution</td>
<td>- Internal information distortion</td>
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<td><strong>Improves communication:</strong></td>
<td><strong>Increases risk:</strong></td>
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<tr>
<td>- Improved co-ordination of processes</td>
<td>- Asset concentration</td>
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<tr>
<td>- Greater goal congruence</td>
<td>- Perpetuates obsolete processes</td>
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<td>- Exaggerates synergies</td>
<td>- Diseconomies of scale:</td>
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<tr>
<td><strong>Improves cost structure:</strong></td>
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<td>- Economies of scale through avoidance of intermediaries</td>
<td>- Balancing scale economies</td>
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<tr>
<td>- Process integration (improved asset utilization)</td>
<td>- Inability of management to control large organization efficiently</td>
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<td>- Avoids switching/transaction costs</td>
<td>- Limits on span of control</td>
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<td>- Increased difficulty in communication</td>
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3.2.1 Theories of the Firm: From Choice to Coordination

As per economics there is always the need of firm production function that process from input to output. Managers play very important role in operationalizing the activity to maximize the profit of the business entity observing the market situations. The business activity must get the perfect information that makes the task easier and supports to move the business smoothly (Furubotn and Richter, 1997; Furubotn, 2001; Williamson, 2004), this system called price mechanism that incurs some cost stated by Coase (1937). Right price discovery is the most important task in price mechanism to control the cost of production (Coase, 1937, p. 390). According to the further consideration, negotiation also has a cost and needs to take in account all the separate contract and the exchange transaction taking place on a market (Coase, 1937, p. 391). The concept of transaction cost economies is the contribution of Coase (Hobbs, 1996, Menard, 2001).
The new theories and emerging body of research originating newer assumptions on economic agents say having perfect information can reduce the transaction cost up to zero (Hobbs, 1996). Being with the limited and imperfect information about economic agents, they face uncertainty in their choices. For analyzing the transactions economically the NIE applies the theory of price mechanism (North, 1995; Williamson, 1985). The changing vegetable supply chain systems with the contractual arrangements over traditional structure are getting more importance and seen as a new model that can establish a new relationship among the firm, buyers and sellers through the vertical coordination in the supply chain (Hobbs, 1996). The vertically coordinated relationship (Young and Hobbs, 2002) has been the first choice of the firms with homogeneous products and the industries perfectly competitive. Instead of contemporary supply chains, supermarkets focusing on vertically coordinated supply chains on differentiated products. The new idea and traditional thought of NIE are getting compared by Williamson (2004, p. 27) to analyze market organization. NIE is the better approach to the supermarket supply chains that has the product specification and works on the contractual arrangements with farmers for mutual benefit. NIE is another approach with alternative framework (Williamson, 2004) suggested when the condition of the market is not supportive for the firm (Furobotn, 2001). For economizing the transaction cost, there must be some mode (Williamson, 1991). Hobbs (1996; 2004) considers that transaction cost can get reduced with vertical coordinated approach in current vegetable supply chains where cooperation and transparent exchange of information can significantly contribute to the success.

Agro industrialization is another concern by Cook and Chaddad (2000) that highlights the reasons behind the expansion of the global vegetable food economy and highlighting the importance of multidisciplinary approaches for the understanding of such activities. Different research presented reviewing the evolution of agribusiness since mid-1950 on both micro and macro level. The macro level includes the discussion about commodity systems approach, industrial organization, transaction cost economics, agency theory and agri chain networks. The micro level is about farm management with technical efficiencies, resource base theory and incomplete contracts. Contemporary management theory is better understood than conventional production theory for vegetable sector in many developing countries with technological and institutional changes by Reardon and Barrett (2000).
3.3 New Institutional Economics

The economic transaction cost and emphasis on facilitation for institutions with coordination is the major concern of Coase (2000). The coordinated approach for the activities of economic players by the attempt of NIE is the incorporation of institutions and institutional arrangements (Harris et al., 1998; Menard and Shirley, 2005). The basic underlying theory of NIE is on the assumption of neoclassical economics. Moreover the economic analysis is another contribution of NIE which is not included in neoclassical economics (North, 1995). The different investigations done by different disciplines generated the interdisciplinary studies have cross fertilized the knowledge on origins and scope of NIE (Nabli and Nugent, 1989). NIE has been used by many researchers as an approach for farmers to analyze the farmer’s participation, contribution and impact on contractual relationship in contemporary vegetable supply chain system (Dorward, et al., 1998; Harris et al., 1998). Nabli and Nugent (1989) takes uncertainty on transaction cost and information cost are most important in NIE though there is lack of strong consensus on the inclusion of variables. Harris et al. (1998) consider problems with NIE and highlights as uncertainty with contract, the cost of information, asymmetry, the cost of transaction, holding up of crop, collective action, common pool resources and free-ride. Many researches on NIE unveil only transaction cost economics, contractual relations and property rights as component (Furobotn and Richter, 1997; Menard, 2005). If we get in detail all are interrelated. Economic activities determine the extent of transaction costs in the whole exchange process (Furobotn and Richter, 1997). The transaction cost analysis can support in understanding of different arrangement of organization with its characteristics (Menard, 2005). Williamson (2005) argues that contract arrangement sometimes goes with the positive costs for transaction. Though practically very difficult to write exact contracts (Williamson, 2000) then also it helps in reduction of all the (Menard, 2005) asymmetric information is the most common problem that results in moral hazard (Miller, 2005). Finally NIE is well equipped having the well-defined property rights in economic transactions and appropriate enforcing institutions which can help in reduction of conflicts and facilitate cooperation (Nabli and Nugent, 1989; Furobotn and Richter, 1997; Menard, 2005). This research is including the main areas of NIE considering the transaction cost and farmer’s participation in new vegetable supply chain systems specifically the vertically coordinated vegetable supply chain.
3.3.1 Transaction Costs and Participation in the VCVSC

Transaction costs got introduced for economic analysis firstly by Coase (1937). Price mechanism is not only the factor to govern the economic system. Many other cost he introduced as important as price like costs associated with negotiating and contracting. Organizations need to control these costs for economic profitability. Transaction costs include many costs as search and information costs, bargaining costs, decision costs, supervision costs and enforcement costs (Furubotn and Richter, 1997). Information is most important in decision making process which is costly and not always as desired (Harris et al., 1998), since costly sometimes with a less information players take the decision. The costs must be differentiated as ex ante and ex post (Ostrom et al., 1993) to reach the agreement. As new vegetable supply chain system is new to farmers, they must get the needful information about the benefits of the participation with this and the support available to establish a sustainable venture. Agribusiness firms must get the information about their potential suppliers and the information about farmers with their business volume. Transaction cost increases when there is a shift of supply from one farmer to another farmer (Alvarado and Charmel, 2002). The information search cost increases the gap between agribusiness firms and the farmers to establish the negotiation. The strict regulation for grades and standards in vertical coordinated supply chain system farmers face a high risk of holding the product if not fulfilling the exact specification (Reardon et al., 2001). A high cost involved in monitoring and controlling the product from being perished effects the trust of relationship in between seller and buyer (Chambers and King, 2002).

The three dimensions suggested by Williamson (1985) considering that the transaction activity depends on some economic reasons. The three dimensions are asset specificity, uncertainty and frequency. Asset specificity is the way that an asset can be alternatively used with its best, uncertainty is much unknown or can say in the dark and nobody knows the degrees of success or failure and frequency is the repetitions of transactions in cardinal numbers. The high specificity assets lead to the situation party with investment faces the risk and other party becomes opportunistic being the investor tied with agreement of limited uses of the asset (Harris et al., 1998). The contract farming critically evaluated argues small farmers allow firms to behave opportunistically being the monopolistic characteristics of agribusiness firms (Grosh, 1994; Little and Watts, 1994).
Sometimes firms face uncertainty because farmer breaches the contract but the agribusiness firm does not sue them with legal and social costs (Singh, 2002). Uncertainty can be due to many reasons like natural factors or pest attacks leads to high risk losing crop and investment and the risk shifts to the agribusiness firm as losing the crop expected to get for processing plants. The transaction frequency and the way it is organized is also associated to the transaction costs. In vertical coordinated supply chain systems the product demanded with a particular characteristics in a consistent manner which can make spot markets inapt for some produces (Boehlje, 1996) since needed a constant monitoring (David and Han, 2004). Transactions can be managed based on three dimensions of asset specificity, uncertainty and frequency with proper governance (Williamson 1991) to reduce the transaction cost. Generally coordination is needed to control the increasing transaction cost (David and Han, 2004).

3.3.2 Collective Action and Participation in the VCVSC

Institutions are the most important to reduce the transaction costs (North, 1995; Williamson, 2000) and sees a strong relationship between institutions and organizations. In the whole game Institutions are the rules whereas organizations are players who follow these rules. Society is also considered as the game where institutions are the rules to create constraints and controls human interactions (North, 1995). Collective action is related to institutions since many people together make an institution. The collective action as a concept focuses on many institutional and organizational structures and they vary with each other mean different from person to person. Collective action exists in many different forms as informal networks, cooperative system and strategic alliances defended by Peterson et al., (2001) in the vertical coordination continuum. To get the necessary inputs for vegetable cultivation with reaching the scale with maintaining variety, price and bargain power, farmers should move with a collective effort (Holloway. et al., 2000; Lyon. 2003). All the organizational bodies like political, social, economic, educational, firms, social are players of the game working together for a specific purpose to reach organizational objective (North, 1995). Due to high competition or unfavorable environments, it is needed for organizations to shape institutional changes that favor them by getting skills and knowledge for the survival (North, 1995). Innovation is very important (Reardon and Barrett, 2000; Cook et al., 2001; Pinstrup-Andersen, 2002) to have a ‘fair game’ to attract farmers to participate in new vertically coordinated supply chain system maintain the
numbers count is the key role of organizations as they are unorganized (Esman and Uphoff, 1984). The cooperative movements launched in the England and Germany during nineteenth century supported their members in many ways as economically and politically that helped in generating gains (Esman and Uphoff, 1984).

Collective bargaining is the best alternative and the way for farmers to negotiate with traditional supply chain problems, buyers, suppliers and government to achieve the market power (Levins, 2002). The collective action can get implemented only with the new thought with organizational effort to control economic power and to understand the effective implementation of this power. The participation in collective action varies farmer to farmer as per their need and situation but the most common one among them is networks, cooperatives and strategic alliances. Thus hypotheses formulated in this research will help farmers to understand the transaction cost mechanism and will help to overcome the problems associated in traditional vegetable supply chain. Mutual benefit is the most important to establish associations of individual or organizations when communicating with each other in a network (Holmlund and Fulton, 1999). The developing information and communication network has emerged as the most powerful tool in this era of competition where the associations and networks can play pivotal role in sharing and distribution of information. Casson (2000) explains the benefits of networks as a tool to connecting many entities together with a linkage and trust. According to Murdoch (2000) rural development is possible with development of these networks and associations that can help in overcome with problems in the existing vegetable supply chain systems. There can be many types of network establishment like vertical relationship, horizontal relationship, formal, and informal depending upon the need and situation with flexibility. The flow of information and services in a network is not always unidirectional so associations must get restructured to get the maximum benefit out of the network (Holmlund and Fulton, 1999). The network establishment approach can be very beneficial for small farmers to set up associations with different participants to lower down the information cost that can lead to a successful and sustainable vegetable supply chain system.

Networks are very important which takes comparative longer time to establish inter firm relationship (Sporleder and Moss, 2002). Ziggers and Trienekens (1999) in their research considers the concept of vertical coordination which absence in traditional supply chain needs interdependence and control on each successive stage that can help them to
engage firms in manage and control the flow high customer value products or services. Omta et al. (2002) put their interest on varied disciplines as business, sociology; economics and engineering contribute with their nature of interaction and communication involved in network relationships. A great contribution of Murdoch (2000) discusses the entire varying network available with their condition to operate and encourages the necessary adjustments. A very good differentiation presented by Casson (2000) that separates good networking and bad networking specifying good networking with transparency, entrepreneurship and public good provision whether bad networking with dense and closed relationships.

Cooperatives are formed voluntarily to meet their common economic, social and cultural needs by the individuals and autonomous association of individuals united together (Gertler, 2001). Farmer organizations with the development and ongoing changes in vegetable supply chain systems are developing as cooperatives and other structures are also focusing on generating profits (Brester and Penn, 1999). In farmer owned cooperatives farmers are responsible for getting the contract and to fulfill the contract with agreement to deliver specified quantity of produce to cooperative (Stefanson et al., 1995; Stefanson and Fulton. 1997; Merrett and Walzer, 2001). Holloway et al. (2000) poor experience with African cooperatives but other hand in some countries cooperative structures are interesting and helping organizational innovation to help small farmers to participate in commercialized economy with lowering down the transaction cost. The commercialization of perishable items can get through the bulking for the produce having no market demand (Holloway et al., 2000). A well-structured and defined property right can control the free rider problems arising in cooperatives (Cook and Iliopoulos, 2000) moreover a disciplined way encourages the trust and reputation among cooperative members (Chambers and King, 2002).

Strategic alliances are the groups of people or organizations having common goals and objectives (Holmlund and Fulton, 1999) join together to execute activities cannot perform alone on them. Strategic alliance provide some flexibility as the each firm partnership remains independent but fulfill the specific commitments and keep themselves bounded the common goals (Dussauge and Garrette, 1999). Vegetable supply chains can get involved in partnerships strategic alliances that offer farmers and farmer organizations the opportunity to respond to changes with their independence. Strategic alliances are the
solution to the problems of skill access independently to carry the products from farm to market (Holmiund and Fulton, 1999). The widely accepted model by Ziggers and Trienekens (1999) includes four factors for the successful partnership as mutual benefit for all participants, a good plan accepted by all the partners, complete involvement at all levels and organizational flexibility.

3.3.3 Limitations of New Institutional Economics

NIE has many contributions in its accounts to the supply chain mechanism in economics then too need to see its limitations and problems associated with this. There are some theoretical drawbacks with NIE as the statement that since transaction cost minimization is their function so institutions minimize transaction costs (Harris et al., 1995). Other is the effects of property rights are measured empirically and the efforts of transaction costs are insufficient (Bardhan, 1989; Toye, 1995). The high volume of research on NIE during the last decade on empirically tested publications have exceeded (Williamson, 2000) then also NIE and the contribution of transaction cost economics in vegetable supply chain can still get some better ideas providing better and better empirical work. Williamson (2000) realizes on the fact that researchers are still much ignorant about institutions and concludes saying NIE has much opportunities ahead for the development of the best theory. Bardhan (1989) emphasizes the tendency of opportunisms and free riding problems regarding collective action high in collective action. The problems arising due to unbalanced power among agents in the NIE has been ignored in the development of institutions. The criticism on NIE by Bates (1995) is the creation of economics and acknowledgement has been too slow being with the political arena rather being with the market. Dysfunctional institutions should get cared to stay for a longer time and save it from unbalanced (Bardhan, 1989). The development can be achieved only with the development in equitable access to public services, resources and political power (World Bank, 2006b). Literature and research needs to find mechanisms to reduce the problems associated with collective action as problems of property rights (Cook and Iliopoulos, 2000) and trust and reputation (Chambers and King, 2002).
3.4 Production to Consumption Concept

United Nations World Summit on Sustainable Development defines the sustainable consumption and production as to promote social and economic development within the carrying capacity of ecosystems by addressing and where appropriate de-linking economic growth and environmental degradation through improving efficiency and sustainability in the use of resources and production processes and reducing resource degradation, pollution and waste by Singh, U. S. and Mishra, U.S. (2013); Singh, U. S., Mishra, U.S. and Mishra, B.B. (2014); Singh, U. S. and Mishra, U.S. (2015); and Singh, S. (2013). UK department for environment, food & rural affairs Continuous economic and social progress that respects the limits of the Earth’s ecosystems, and meets the needs and aspirations of everyone for a better quality of life, now and for future generations to come. An efficient supply chain is one in which waste is minimized, the required standards are met consistently and members of the chain are able to invest in their businesses and in improving the efficiency of the chain. If companies are to have the confidence to invest, they require adequate returns on their investment and commitment from further along the supply chain.

Source: A Business Primer Sustainable Consumption and Production, Jan 2007, University of Cambridge

Fig.3.3: The Sustainable Consumption and Production Wheel
3.4.1 Production Concept

Organizing exchange among farmers and traders for trade and transactions attributes of transactions are more important that can lead to the best governance structure. Douma and Schreuder (1998: 173) used this framework and used the approach firstly. The relationship among the three participating factors asset specificity, uncertainty and frequency presenting a specific framework showing the interaction among factors in the figure below.
Fig. 3.5: Asset Specificity, Uncertainty and Frequency Relationship Framework

The asset specificity has been used in the \( x \)-axis of the framework. The asset specificity has been classified as low, moderate or high in order to be consistent with categorizations from earlier results. Transaction attributes were measured from both sides of the transaction, meaning, for farmers and for traders. This means that asset specificity could either be low for both, high for both, or moderate for both. Uncertainty is measured on the \( y \)-axis using the same classifications: low, high or moderate for both transacting parties. Frequency is taken into consideration depending on the situation. The result is a framework with nine possible contractual scenarios for different combinations of asset specificity, uncertainty and frequency.

**Case 1** is a situation where asset specificity and uncertainty is low for both transacting partners. In this case the market is the best governance structure for coordinating transactions. The optimal contract type for market governance is classical contracts under market-based governance. When transaction uncertainty increases to moderate, but asset specificity is still low, and then we have a situation of **Case 2** where classical contracts under market-based governance are still the optimal modes of organization. **Case 3** is a
situation where asset specificity is low but uncertainty is high for both transacting partners. In this case, we must take transaction frequency into consideration. For occasional (low) transactions, classical contracting under market governance is the best alternative. For repeated (moderate and high) transactions neo-classical contract under hybrid governance is first best. The same decision is made in Case 4, where asset specificity is moderate for both parties but transaction uncertainty is low. The invested assets warrant that for occasional transactions, a classical contract is enough but when transactions are repeated, it is best to create a neoclassical contract. Case 5 is a mediocre state, where moderate asset specific investments are used in a semi-uncertain transaction atmosphere. The level of investments and uncertainty calls for a neoclassical contract within the governance structure. Case 6 involves moderate asset specific investments in a highly uncertain transaction. At least a neoclassical contract is in order for occasional transactions while recurrent exchanges are better off with long term contracts. When asset specificity is high but uncertainty is low for both transacting partners as in Case 7, creating neo-classical contracts that fall under hybrid modes of governance are the best for transactions that are occasional. Recurrent transactions require a long term or a relational contract in order to minimize transaction costs. Case 8 is a situation where asset specificity is high for both parties while uncertainty is moderate for both. In this case, a neo-classical (for occasional transactions), long term or relational contract (for recurrent transactions) mitigates asset specific investments and uncertainty for both parties. The last case, Case 9 involves a situation where we both have high asset specific investments and high uncertainty. A long term or relational contract is best for both transacting parties to protect their interests and reduce transaction costs. The grey shadow illustrates situations of increasing transacting coordination while the white areas in the figure represent less need for intensive control coordination mechanisms.

In sum, the framework shows evidence that based on transaction attributes a classical contract where price is the main coordinating mechanism is optimal for commissioner-based governance structures. However, the nature of the market-based classical contracts mean that the identities of transacting parties are irrelevant and only prices motivate transactions. A trade-off between capturing high prices and transaction uncertainty is observed. Although the governance structure has evolved to function in an optimal manner given the institutional environment, it incurs the highest monitoring and
enforcement costs among other alternatives, as participants’ respond against possible opportunism.

A neoclassical contract where price and safeguards play equally important roles is best suited for wholesaler-based governance structures. In neoclassical contracts, identities of transacting parties begin to matter. Based on transaction costs alone, the wholesaler governance structure is the one that minimizes transaction costs most, relative to the other two arrangements. However, a trade-off exists within this organizational mode: that of minimized transaction costs and the locked-in effect. The framework shows that given the institutional environment, wholesaler governance is functioning optimally when using neoclassical contracts in a hybrid mechanism. It incurred the least total transaction costs among governance alternatives, due to the low negotiation and low monitoring costs. However, negotiation and monitoring costs could be low because of the locked-in effect: farmers have no alternative but to sell harvests to wholesalers in order to pay off their debts. The framework shows that a long-term contract where identities of transacting parties and safeguards matter is optimal for contractor-based governance structures. Using relation-based contracts in order to create binding trading relations works best for this governance structure. It incurred high negotiation costs because the farmers’ whole harvest is at stake. Moreover, negotiation within a relational contract involves communication and adjustment to each other’s personal and business interests. Note that the search process for trustworthy contractors increases relative search/information costs but reduces relative monitoring costs later on.

3.4.2 Consumption Concept

Almost all practices involve the use of material resources, regardless of whether these practices are categorized as production or consumption. In ecological terms, human society can be seen as a metabolic organism appropriating resources from the environment, transforming them for purposes useful for humans, and finally discarding them as waste. Conventionally, the process of transforming resources and intermediate products for useful purposes is called production, while the final use and destruction of useful products is called consumption. To some extent this distinction coincides with the distinction between the social domains of business sectors and households, but productive activities also take place in households, and activities usually considered to be consumption also occur at the
workplace (Ropke, 2004). Domestic practices are environmentally relevant in so far as practitioners appropriate and transform resources. The link between a practice and the environment thus goes through the material component—that is, through the production, use and discarding of the materials, equipment and infrastructure needed to carry out the practice. The concept of consumption is used here to capture the appropriation and transformation of resources in relation to domestic practices. This “definition” of consumption emphasizes that the transformation of material goods into waste, while obtaining services from the goods as an aspect of various practices, is a process which in most cases takes place over a longer period. Consumption is thus distinguished from market transactions and the economic concept of demand (as done by (Boulding, 1945; Daly, 1991). This distinction is useful also because households procure goods and services for application in domestic practices in other ways than through market transactions. For instance, eating practices require the input of meals, provided by the supporting practice of cooking, based on the input of primary produce. In some cases, the inputs are provided within the domestic domain itself, as when household members do the cooking, sometimes even based on primary produce from the household’s garden. But often, inputs of goods and services from other domains are required: primary produce can be bought through the market or received as a present from neighbors and friends; also the cooking work can be provided commercially, through acquaintances, or by public provision. In general, four modes of provision are identified: market, state, communal, and domestic.

3.4.3 Sustainable Agriculture and Horticulture in Odisha

Sustainable Development is the management and conservation of the natural resource base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry, and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable (FAO, 1989).

Sustainable Agriculture ensures that the basic nutritional requirements of present and future generations are met, while providing a range of economic, social and environmental benefits. It provides durable employment, sufficient income, and decent
living and working conditions for all those engaged in agricultural production. It maintains and, where possible, enhances the productive capacity of the natural resource base as a whole, and the regenerative capacity of renewable resources, without disrupting the functioning of basic ecological cycles and natural balances, destroying the socio-cultural attributes of rural communities, or causing contamination of the environment.

Food security is achieved “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (World Food Summit, 1996). The multi-dimensional nature of food security includes food availability, access, stability and utilization defined as:

- **Food Availability**: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports.

- **Food Access**: Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).

- **Food Stability**: To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

- **Food Utilization**: Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs to food security.

A group of Canadian scientists (MacRae et al., 1990) defined sustainable agriculture as: sustainable agriculture is a philosophy and system of farming. It has its roots in a set of values that reflect an awareness of both ecological and social realities. It involves design and management procedures that work with natural processes to conserve all resources, promote agro ecosystem resilience and self-regulation, minimize waste and
environmental damage, while maintaining or improving farm productivity and profitability. The producers (Murthy M.R.K., *et. al.* 2014) of grapes in Andhra Pradesh sold grapes in the field itself to the distant market wholesalers and to the local market retailers. The research carried by Chang C., *et. al.* (2015) says that the market situation in Port Moresby is in a state of flux, on both the demand and supply fronts. Continued research, and ongoing monitoring of the market situation, is essential to allow informed decision making for the relevant industry and development agencies.

The concept set out by the Technical Advisory Committee (TAC) of the Consultative Group on International Agricultural Research (CGIAR) states “Sustainable agriculture is the successful management of resources for agriculture to satisfy the changing human needs, while maintaining or enhancing the quality of environment, and conserving natural resources”. The United States Department of Agriculture defined ‘Sustainable agriculture’ as a management system for renewable natural resources that provides food, income and livelihood for present and future economic productivity and ecosystem services of these resources. Sustainable agriculture systems are those that are economically viable and meet society’s need for safe and nutritious food while maintaining or enhancing natural resources and the quality of the environment for future generations (Baier, 1990). The firms interconnected in the supply chain represent potential markets for research because the current uncertain economic situation poses a major challenge for business leaders in decision making by Zsolt T. and Csaba S., (2015).

### 3.4.4 Indicators of Sustainability

Indicators are a composite set of attributes or measures that embody a particular aspect of agriculture. Indicators are quantified information, which help to explain how things are changing over time. Sustainability indicators look at economic, social and environmental information in an integrated manner. Many professionals agree that at least three criteria should guide the development of sustainability indicators (Jeff Tschirley):

- **Policy relevance** - indicators should address the issues of primary concern to a country or district and receive the highest priority. In some cases policy makers may already share concern about an aspect of sustainability (e.g. land degradation) and be ready to use indicator information for addressing the issue.
- **Predictability** - to allow a forward-looking perspective that can promote planning and decisions on issues before they become too
severe. Anticipatory decision-making is at least as important to sustainable agriculture as is recognition of existing problems. Measurability - to allow planners and analysts the means to assess how the indicator was derived, either qualitatively or quantitatively, and decide how it can best be applied in the planning and decision-making process. The supply chain analysis has considered the aspects of business planning, supply and demand management, inventory, transportation, logistics optimization from the perspective of information sharing to satisfy the need of the end customers by Bikram K. Bahinipati (2014).

Gotz, L., et.al. (2014) identifies that even in the liberalized market price transmission is asymmetric for some exporters even where due to a minimum price agreement only chances are to become symmetric, established by the government in the grapefruit market. The outcome of the research by Singh, U. S., Mishra, U. S. and Mishra, B. B. (2014) is for the consumer in terms of price, largely it can support all the intermediary participants of vegetable supply chain and beneficial for the farmers engaged in vegetable cultivation. In simple terms supply chain management link all the supply interacting organization in an integrated two way communication system to manage high quality inventory in the most effective and efficient manner by Ahamad T., et al.(2014). Odisha is the second major Cabbage producing state in the country and accounts for 14% of the total production of cabbage in the country produces about 1.15 m. MT of cabbage from an area of 0.04 m. ha with productivity of 28 t/ha which is the highest among cabbage producing states. The major cabbage producing belts in the state are Baleshwar, Bolangir, Cuttack, Dhenkanal, Ganjam, Keonjhar and Koraput constitutes 0.39 lakh MT of cabbage have been traded in organized markets with average price of Rs. 12.55/kg. Odisha is the third most Cauliflower producing state in the country and accounts for 12% of the total production of cauliflower in the country produces about 0.68 m MT of cauliflower from an area of 0.05 m. ha, with productivity of 15 t/ha, 4.80 lakh MT of cauliflower have been traded in organized markets with average price of Rs. 18.83/kg. Odisha is the fourth major Okra producing state in the country and accounts for 11% of the total production of okra in the country produces about 0.65 m. MT of okra from an area of 0.07 m. ha with productivity of 9.3 t/ha. 0.06 Lakh MT of okra have been traded in organized markets with average price of Rs. 19.82/kg. Odisha is ranked first in production of Sweet Potato accounting for 38% of the total production of sweet potato in the country producing about 0.41 m. Mt of sweet potato from an area of 0.04 m. ha with productivity of 9.3 MT/ha. The recommended
varieties of sweet potato in the state are Buban Sankar and Gouri. Odisha contributes to about 3% of the total production of Onion in the country produces 0.39 m. MT of onion from an area of 0.04 m. ha. with productivity of 11.1 MT/ha. 2.11 lakh MT of onion have been traded in organized markets with average price of Rs. 16.17/kg.

3.4.5 PPP for Sustainable Horticulture

The innovations system literature focuses on the economic and social institutions that affect the opportunities for science-based innovation within a given social or geographic region (Dosi et al. 1988; Hartwich et al. 2003). This literature has contributed significantly to discussion of networks and their effect on the activities and interactions that generate innovation. Moreover, it extends discussion from the role of the Schumpeterian entrepreneur and firm to the wider importance of social institutions and their interactions with public and private research organizations. As per the conference paper (Patel. A., Sharma. M, Pandya. M), to develop the integrated agri-value chain, linking various stack holders of agriculture market the Public Private Partnership approach can provide a better platform. The “Integrated Agro-Bridge Center”, is the center to this approach for the identification of a common interest space, which would not only fulfill the agriculture input requirement but also provide better and efficient agriculture produce market.

Agricultural products are depending upon the geographical advantages and distribution can be done on the basis of particular crop and production hubs in India. Indian agriculture can get evaluated to make it from supply driven, inefficient, low value business scenario to a high-tech, organized, demand-led and high-value orientated.

![Fig.3.6: PPP for Horticulture](source: Hartwich, Janssen, and Tola (2003, 6).)

*Domestic, regional and international marketing channels for fresh horticulture product in Kenya*
Fig. 3.7: Agricultural Produce Supply Chain Africa


Fig. 3.8: PPP Approach for Sustainable Development of APMC in Gujrat

Principles of existing PPP model represent unique and advanced aspect of agriculture in Gujarat is providing an effective, technical and commercial high-end platform to Indian agriculture sector, educating various stakeholders of Indian agriculture process and creating a direct interface between various stakeholders. Appreciating the imperative of intermediaries in the Indian context, the PPP model virtually clusters all the agri-value chain participants, delivering the benefits on equal ground. The PPP model makes use of the physical transmission capabilities of intermediaries – aggregation, grading, logistics, counter-party risk and bridge financing – by providing them the chain of information flow and market signals. With a judicious blend of click & mortar capabilities, “Integrated Agro-Bridge Center” managed by representative of farmers self-help group, farmers’ cooperatives, Government and APMCs officials as well as the professionals from investors. The model would enable the agricultural community access ready information in their local language on the weather, market prices, disseminate knowledge on scientific farm practices & risk management. It would also facilitate the sale of farm inputs, purchase farm produce from the farmers’ doorsteps and provide them more efficient market through APMCs.

3.4.6 Construct Development

General characteristics variable is to ensure that we are choosing the right respondent. It is recommended that who should get involved in the study (FAO Report). Volumes and flows variable gathers the information on the number of producers and traders, market integration and profit margins with prices and supply chains (FAO Report). Constraints variable has the purpose to gather information on the capacity of markets and challenges faced by farmers. Credit and stocks strategy variable provides a view of households demand for trader credit, and the willingness of traders to provide it. In many cases, requesting more credit is an essential coping strategy to deal with shocks (FAO Report). Prices and transaction cost is an important variable because it provides information on the price households have to pay for food and the price households obtain when selling cash crops/products at the market by Singh, U. S. and Mishra, U.S. (2013); Singh, U. S., Mishra, U.S. and Mishra, B.B. (2014); Singh, U. S. and Mishra, U.S. (2015); and Singh, S. (2013). Also, the provision of credit may influence the prices (FAO Report).
The vegetable production is using advanced technology as per the study conducted by Doncic and Nastic. A good input can have the good output so selection of the input is the most important, is done considering the yield potential, timelines, fruits- size, shape and color, diseases and pests resistance with the latest technology. Producers opine that the selection of input materials depend on the market variables like prices and entrance fee. Quality of vegetables is another important factor to determine the price, speed and continuity of sale. Quality depends on the choice of the retailers on the quantity of stock, quality of stock, variety (assortment) to offer or product assortment (Chandon P, Hutchinson JW, Bradlow E.T). Variety attracts customers and creates traffic to stores (Briesch R.A, Chintagunta P.K. ), providing the most preferred brand or product is available (Iyengar S.S, Lepper M; Broniarczyk S.M, Hoyer W.D). Marketing cost would make the vegetable costlier, lead to challenge of high price for perishable product and will not attract new customers. Prices of vegetables have caused by the large seasonal fluctuations and it is a big excitement in the study by Doncic and Nastic. A consumer expectation of variety and actual variety are not correlated but varies with market conditions (Hoch SJ, Bradlow ET; Wanke M, Lehmann G, Bless H).

The role of income in determination of price of food across the globe is the most important and studied by researchers (Gallet, 2010). Only a few studies are available as investigation on the demand characteristics of vegetable (Meng et al., 2013; NIU and Wohlgenant, 2013; and Durham and Eales, 2006). The basic consumption of vegetable and fruit per capita per day is mentioned in the study of Banwat et al. (2012) is adequately described globally by WHO. Domestic food production only cannot fulfill the demand; the overall availability of food at the micro-level depends on other factors like commercial food imports and food aid (FAO 2006). In most research work the availability of food depends on supply side factors (Barrett and Lentz 2009). The availability of resources and infrastructural facilities are the other factors determine the food availability and are allocated across different income and non-income generating activities (Hoddinott 2012). Factors such as culture, religion and social status are also influencer to food preferences and leads to varied demand for produces (Atkin, 2013), not only this but factors like ethnicity, social discrimination and gender inequality also play an important role by preventing participants in public food assistance program (Dohrmann and Thorat 2007; Jayne et al. 2001). Ahumada and Villalobos (2009) review models for the agri-food...
business where products may be perishable or not, but their focus is on procurement and harvesting planning and the only goods they are interested in are crops. Most of reviews are only concerned about perishability, are most of them done in the field of inventory management such as Nahmias (1982), Raafat (1991), Goyal and Giri (2001) and Karaesmen et al. (2009). There is also the review performed in Pahl et al. (2007) that is only focused in production planning and inventory. There are other reviews worth mentioning concerned not only about perishability, but that also have a relation with it.

Quality, safety and sustainability are identified as the key issues in food distribution by Akkerman et al. (2010). Direct spoilage, physical depletion and obsolescence are identified three categories by Ghare and Schrader (1963) in vegetable industry. This firstly explained by Raafat (1991) mentioning the definition as “any process that prevents an item from being used for its intended original use” and named it spoilage, physical depletion and decay. Perishability is defined by Nahmias (1982) as items lifetime is specified beforehand. Another concept added is the shelf-life (Kilcast and Subramaniam, 2000) as the length of the time between manufacture and retail purchase remains saleable or satisfactory. Shelf-life may reflect its marketable life (Xu and Sarker, 2003). Attributes of vegetables are constituted basically with the flavor, aroma color and shape (Tan 2000). Visual look, smell and aroma are the top rated attributes by Florax et al. (2005). Consumers willing to pay and is a part of consumer behavior like to pesticide free vegetables (Boccaletti and Nardella 2000; Onozaka et al. 2006). Eco-labels for fresh fruits and vegetables showed a price premium (Loureiro et al. 2002; Mabiso et al. 2005) and provide the most effective market signal (Loureiro et al. 2001; Mabiso et al. 2005; Marchesini et al. 2007; Rodriguez-Ibeas 2007). Consumers will proceed to do what makes most sense for their wallet (Horsky et al. 2004) and farmland preservation support is being the another important concern for Bond et al. (2007) in vegetable industry.

During the hot rainy season, vegetables suffer from yield losses and mulching has improved the growth of many vegetables compared to the non-mulched controls (Pandita & Singh 1992). Simple, clear plastic rain shelters prevent water logging and rain impact damage on developing fruits, with consequent improvement in tomato yields (Midmore et al. 1992). The gap between supply and demand for the food items is the most serious threat to the survival of humanity (Yadav & Sehgal, 2004). The changing custom of society is accepting mild or minimal processing and preservation for food can lead to high
convenience and nutritional value (Wiley, 1994) is advantageous to the industry. The wastage of vegetable in season and limited supply during off season leading to higher prices are the concern of the study (Habwe, 2008; Abukutsa-Onyango, et al., 2006). Appropriate preservation and storage methods should be performed in order to prolong the consumption of such nutrient-rich foods all year round (Chavasit et al., 2002).

Increasing demand for food and the pressure on production to reach the demand can also be reduced by tapping into the reduction in food losses Choudhury (2006). Actions should be taken with all the part of the food chain, since it is interconnected and one activity affects the other (Rolle, 2006). A pre forecast of consumer demand can control the food (Parfitt et al., 2010). Future market must not get ignored and need to get placed to bring the transparency in the framework of food demand and supply (Newbery and Stiglitz 1981, Kawai and Zilcha 1986, Frechette 2000, Moschini and Hennessy 2001, Allen and Lueck 2003). The notion of market transparency approach is adopted from the work of Eckwert and Zilcha (2001, 2003) along with the contributions of Blackwell (1953) and Hirshleifer (1971). The informative success is only possible when there is market transparency and correlated with the future spot price leading to increase in farmer’s expected profits (Ahlers et al, 2013). To differentiate the supply channels among urban and rural business, Fellows (2002) proposed a conceptual framework for food marketing systems for different product type. The supply channel differentiation on the basis of produce type can get done in vegetable industry as well by Braadbaart (1994). Bergeret and Ha (1997) separated pig and garlic marketing chains. Product, credit and information focusing on specific product chains have been described by Le Goulven (1999). Trust and relationship building in the literature Granovetter (1985), Platteau (1994a, b) and Moore (1994) looked at the relationships between markets, trust among stakeholders and social networks. Particularly worth highlighting is Platteau’s (1994b) review of game theory. Platteau (1994b) shows that assuming trust as a generalized conduct among players can lead to sustained win-win situations, even with some occasional cheating involved: a much more optimistic view to market relations than that obtained through the use of a prisoner’s dilemma model (Palmer, 2002). Reputation and trust building between buyers and sellers is an important strategy to manage transaction costs (Batt and Parining, 2002; Batt and Rexha, 1999; Fafchamps and Minten, 1999). Major components of vertical coordination
are Mutual Interest, Long Term Relationships, Shared Benefit, Open Information, Stability and Interdependence (Peterson et. al., 2001).

The four different constructs have been formed to solve the purpose are (1) PSCV (Producer Supply Chain variables) (2) ISCV (Intermediary Supply Chain variables) (3) VCV (Vertical Coordination variables) and (4) VCEV (Vertical Coordination Effect variables). The effort is expected to give an insight of the problems and would attempt to suggest remedial measures for cost optimization and efficiency in the supply chain of vegetables from farm to consumer.

**PSCV (Producer Supply Chain variables):**

PSCV consists of all such measurement variables which are linked to the design and operation of physical, management information and financial systems needed to transfer vegetables from point of production to point of storage and distribution in an efficient and effective manner.

PSCV contains four variables, namely, Market and Selling, Constraints, Credit and Stock Strategy, and Prices & Transaction Cost, for which data are converted to 5 points scale. Each such variable is again composed of multiple numbers of items. The final score of each set of items got averaged and that average score is the final score of variables taken for data analysis.

**ISCV (Intermediary Supply Chain variables):**

ISCV consists of all such measurement variables which are linked to the design and operation of physical, management information and financial systems needed to transfer vegetables from point of storage, production & distribution to point of selling in an efficient and effective manner.

ISCV formed of four variables measuring the capacity of intermediary to participate in the vegetable supply chain (Volumes and Flows, Constraints, Credit and Stock Strategy, Prices and Transaction Cost), and for measuring one variable, multiple numbers of items are taken and data collected are converted to 5 points scale. The final score of each set of items got averaged and that average score is the final score of variables taken for data analysis.
VCV (Vertical Coordination variables):

Vertical coordination in vegetable supply chain is defined as the phenomenon in which farmers and intermediaries are acting or working together for a shared purpose of achieving financial benefit.

This third construct VCV has fourteen variables (Perishibilty, Wastage, Yield, Demand Security, Non Seasonal Availability, Price Fluctuation, Produce, Variety, Quality Variety, Quantity Variety, etc.) measuring the efficiency of supply chain using 14 items for both producer and intermediary. All the data is in 5 points scale.

VCEV (Vertical Coordination Effect variables):

Vertical Coordination Effect in vegetable supply chain is defined as the outcome of cooperation among farmers and intermediaries working together for a shared purpose of achieving individual, collaborative and agricultural sector growth.

This fourth construct VCEV is grouped with six variables (Mutual Interest, Long term Relationship, Shared Benefit, Open Information, Stability, Interdependence) measuring the effectiveness of vertical coordination in supply chain 18 items has been used in total with 3 items for each variable. The same is used for both producer and intermediary. All the data is in 5 points scale.

So, all the twenty eight variables have been grouped in four different constructs as shown in the further table.

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<th>Sl No.</th>
<th>Constructs</th>
<th>Variables</th>
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<td>1</td>
<td>PSCV</td>
<td>Market and Selling Constraints Credit and Stock Strategy Prices and Transaction Cost</td>
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<td></td>
<td>(Producer Supply Chain variables)</td>
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<tr>
<td>2</td>
<td>ISCV</td>
<td>Volumes and Flows Constraints Credit and Stock Strategy Prices and Transaction Cost</td>
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<td></td>
<td>(Intermediary Supply Chain variables)</td>
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<tr>
<td>3</td>
<td>VCV</td>
<td>Perishibilty Wastage</td>
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<td>Vertical Coordination variables</td>
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<td></td>
<td>Demand Security</td>
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<td>Non Seasonal Availability</td>
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<td>Vertical Coordination Effect variables</td>
<td>Mutual Interest</td>
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<td>Long term Relationship</td>
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The primary focus of this research is to assess the challenges and problems of supply chain of vegetables. The research is lying basically on the concept mapping of thought and concentrating on the validating of thought with empirical evidences. For this concept structure extensive literature review is the base and the concept derived from the secondary sources and practical experience of the market observation. The basic problem lies with supply chain is farmers are not getting requisite realization of price commensurate to their efforts due to lack of storage facilities, poor market information and unorganized faulty supply chain. A better solution can be the Public Private Partnership for the supply chain development and coordinating effort of all the stakeholders of vegetable industry. This has been the one side but the other side is also very crucial for the sustainable output i.e. input support system. Though the initiatives taken by govt. with the amendment of regulations but then also the lack observed during the study is inefficient monitoring system of input supply. So it is needed to develop a mechanism to have the right measurement of loss from source (Govt.) to receiver (Farmer).

The model drawn on the concept of economics where it talks about the demand and supply, but it is a critical thinking that how this demand supply can get measured exactly to reduce the gap and to fill the gap for societal benefit.
3.5 Summary

This chapter is the broader view on the theoretical concept leading to this research. Furthermore the analytical framework and the snapshot of the research hypotheses with results presented. The main idea behind the study and this chapter is to know the need of vertical coordination in vegetable supply chain. For this purpose all the existing theories of economics and business has cited with the relevant explanations of literatures. Hypotheses are based on the measurement of relationships in between producers and intermediaries and its effect on vertical coordination variables using the concept of contract management system instead of choice based (Williamson, 2004; 2005). Different definitions of supply chain presented discussing the types of vegetable supply chain available. New Institutional Economics (NIE) approach is focused on evaluation of market flaws and talks about small farmer’s limitations for participation in vertically coordinated supply chains (Harris et al., 1995). An analytical framework is needed to understand the problems and to develop the mechanism to overcome these challenges and to find opportunities for farmers provided by vertically coordinated vegetable supply chain systems. Advantages and disadvantages of vertical integration (Ellram, 1991) is well presented. For analyzing the transactions economically the NIE applies the theory of price mechanism (North, 1995; Williamson, 1985). Theories of the firm are presented as from choice to coordination discusses the three dimensions suggested by Williamson (1985) considering that the transaction activity depends on some economic reasons. The three dimensions are asset specificity, uncertainty and frequency. Collective action exists in many different forms as informal networks, cooperative system and strategic alliances defended by Peterson et al., (2001) in the vertical coordination continuum. To get the necessary inputs for vegetable cultivation with reaching the scale with maintaining variety, price and bargain power farmers should move with a collective effort (Holloway, et al., 2000; Lyon. 2003). Limitations with NIE are evaluated. The problems arising due to unbalanced power among agents in the NIE has been ignored in the development of institutions. The criticism on NIE by Bates (1995) is the creation of economics and acknowledgement has been too slow being with the political arena rather being with the market. Dysfunctional institutions should get cared to stay for a longer time and save it from unbalanced (Bardhan, 1989).
Reference


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