

# Conceptual Framework to Comprehend the Supply Chain Management of Agriculture Products in Kerala

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## Abstract:

Kerala is a consumer population, and the demand for Agri-products tends to increase further. The focus of this paper is to develop a theoretical construct to identify the relationship between the various players in the Supply Chain Management of agriculture products from Kerala. The conceptual framework is made by identifying the dyadic /Buyer-seller relationship between the players. Value chain analysis is used to identify each activity and node in the supply chain. Characteristic factors that contribute to the dyadic linkages are identified. The supply chain management is analyzed by comparing the marketing efficiency of various chains from the producer to the consumer. The study also suggests an electronic platform to provide information sharing and data backup that can be helpful for further improvements in the sector in terms of research and infrastructure.

**Keywords:** Supply Chain Management, Agri-Supply Chain, Value Chain, Dyadic relationship

## Introduction

Kerala 38,863 km<sup>2</sup>; 1.18% of India's landmass with a population of 33.34 million and with a productivity of 20-25tons/ha does not have any market regulated by Agricultural Produce Market Regulation (APMR) Act. The state is reported to have 348 wholesale markets along with 1014 rural primary markets: (Source: Dept. of Agriculture, Kerala State). Low returns from agriculture have reduced farmers and Kerala turned out to be a consumer state. To attract more people to farming it requires 495 regulated; (Source: Dept. of Agriculture, Kerala State) markets that provide justified prices to the farmers.

## Problem

Supply Chain Management study in the sector can provide information regarding the production and marketing of agriculture products from the state and also understand the various glitches faced by the stakeholders in the sector which may further provide improvement opportunities.

In Kerala, like other parts of India, most vegetable farmers do not own large farm areas suited to produce in bulk and always have to opt for auctioning. Moreover, corporate involvement with farmers is less (only in products like spices, tea, etc.) which leaves them to depend on local traders for their supply and also to sell their products through auctions. The supply chain of this sector is very much fragmented to identify the actors and their relationships which in turn creates an imbalance in the demand-supply patterns.

## Objective

The purpose of the study is to identify the various factors that contribute to the dyadic (buyer-seller) relationships at every node in the Supply Chain of Agriculture products in Kerala and to develop a theoretical framework to evaluate the performance of different channels.

## **Supply chain Management**

Supply Chain Management is a term that originated in the 1980s in the manufacturing sector to reduce the cost of production, transportation, and storage. Thereafter many studies were carried out in this sector where researchers defined a supply chain as integrative phenomena, a system, a series of processes that forms a chain from supplier to consumer, and the like.

This study to identify the buyer-seller linkages is focused on the definition given by Gunasekaran, & Nagi (2004): "Supply-chain management (SCM) is a method for integrating a manufacturer's operations with those of all of its suppliers and customers and their intermediaries". Considering farmers as the manufacturers and seed, fertilizer, and pesticide companies as suppliers while wholesalers, retailers, and consumers belong to the category of customers. In Kerala, an established supply chain is not identified and so the study focuses on the dyadic relationship, the basic form which builds to a network that finally is acknowledged as the supply chain.

## **Agri Supply Chain - Indian Scenario**

Mittal Mukherjee (2008) stated that lack of integration from various stakeholders in the supply chain leads to inefficiency in the agricultural system, causing high post-harvest losses, quality deterioration, high cost of transportation, information asymmetry, and lack of transparency. Each participant in the chain acts independently with little and no collaboration in physical information

Minten et al., (2009) pointed out that, a great majority of fresh produce in India is sold through informal retailers, including roadside and neighborhood stalls, kiosks, and doorstep delivery by hand carts. Organized fresh food retailing through supermarkets is still in the nascent stage and largely confined to a few big cities. In the current, supply-driven market, buyers face great variability of supply in terms of quality, quantity, specifications, and yield. For this reason, most buyers, including food processors and retailers, do not know in advance what to expect from the supply lot

Rahaman, et al., (2013) have stated that market functionaries deprive both producers as well as consumers creating an artificial crisis.

As per Narasalagi, & Hegade, (2013) Supply chain management plays an integral role in keeping business costs at a minimum and profitability as high as possible by a significant reduction in the wastage of fruits and vegetables which benefits both the farmers as well as consumers through increased returns.

## **Supply Chain: Dyadic Interaction Characteristics**

Bowersox (1990), states that overall performance is improved by 'supply chain collaboration' as it facilitates the cooperation of participating members along the supply chain. According to Harland (1996), supply chain interaction focuses on the level of the dyad or two-party relations. The benefits of interaction within supply chains have been emphasized by several authors (e.g. Horvath, 2001; Sahay, 2003).

According to Lambert *et al.* (1998, p. 4), a supply chain consists of the network of members and the links between members of the supply chain. A dyad is not sustainable unless it generates acceptable levels of risk and reward for buyers and sellers (Lee, 2004)

Backstrand & Safsten (2005) have identified the factors affecting supply chain interaction. These include a context (Circumstances), trust, power, the complexity of

product and process, the need for control and flexibility, maturity and time frame of interaction, frequency of interaction, etc.

Collins (2006) argues that the fresh produce supply chain is a system driven by the interaction of its technical (production, processing, transport, etc.), economic (profitability), information-based (communication), and governance (human relationships) sub-systems

Ardjosoediro & Goetz, (2007) mentioned, the formation of a non-official contract farmer system between intermediary buyers (tokeh) and farmers while providing microfinance to farmers during the production period (provisions of operational inputs mainly). This relationship bounds the farmer to sell his harvest exclusively to the respected buyer, usually at an unfair price, and gives capital power to the buyers.

Jraisat (2011), has built a conceptual framework for understanding the producer-exporter relationship and the relationship dimensions in the construct including Trust, Commitment, Collaboration, Coordination, and Communication along with transactional and network dimensions with information sharing and export performance.

Bhattarai (2013) in a study focused on the dyad between growers and their immediate buyers, developed a model to identify factors that constrain the decision-making of smallholders. The analysis suggests that improvements in the flow of information, the introduction of grades and standards; the establishment of innovative cooperative mode market-oriented extension services, and access to affordable ways of resolving contract disputes would help smallholders to achieve better utility outcomes in existing modes of engagement, and also could provide them with new modes of engagement. The study acknowledged that relational contracts are sustained by internal enforcement mechanisms rather than by trust, and are prone to failure if these mechanisms are not effective.

Pandey et al., (2013) have done a case study where they have mentioned the strategy followed by Adani Agrifresh to create an integrated cold chain, that procures directly from the farmers by communicating, transferring information, assistance, training, types of equipment, transportation, and storage, incentives for quality produce and thereby eliminating the quality degradation and unnecessary value addition from the involvement of intermediaries.

According to Parvez (2014), to integrate the supply chain there is a requirement for collaboration and cooperation among supply chain partners. This will happen only if there is trust among the parties, an upfront agreement to share the benefits, and a willingness to change existing mindsets. Supply chain efficiency relies heavily on successful long-term relationships/partnerships where information sharing, joint problem solving, and trust are key success factors.

The actors in a supply chain exchange materials, products, services, money, and information to create value for the end customer. Other examples of benefits from interaction include revenue enhancements, cost reductions, and operational flexibility to cope with high demand uncertainties (Simatupang & Sridharan, 2005).

According to Clark, (2006), the ability to map the relationships that link actors together in a network is useful in a complex environment that experiences changes in the performance of participants from different sectors.

Korpela, (2015); in a study to understand the characteristics of dyadic supply chain relationships, recognized relationship characteristics; in which, information flows, trust,

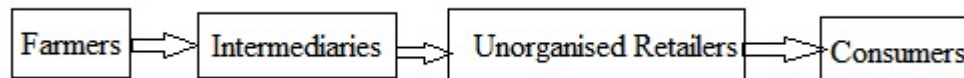
power balance, partner characteristics, distance, etc. operating in supply chains are analyzed and gathered into clusters of themes; former triad into internal (relationship) and later, as external (environment) factors.

Kumar & Sharma (2016) state that farmers can achieve increased knowledge, profits, and other benefits like updated information, etc. through the modern value chains.

An empirical study by Kalidas, et al., (2016), identified three channels that supply vegetables in Kerala. The intermediaries interact with the farmers and collect them to resell them to organized or unorganized retailers. Sometimes in the third channel intermediaries/retailers directly sell to the consumer after directly purchasing from the farmer. The channel involving unorganized intermediaries is reported to be common in the state.

Fig I- represents the Common Supply Chain of Vegetables in Kerala by Kalidas, K. et al., (2016)

**Fig I: Common Supply Chain of Vegetables in Kerala**



*Source: Kalidas, et al., (2016)*

In a study that examined small seller-buyer relationships evolving in emerging markets, interpersonal trust contributed to maintaining sustained marketing relationships (Dadzie et al., 2018).

Research on how fruits and vegetables are distributed revealed themes for framing strategies at the dyadic level, such as partnerships, prices, and remunerations (Jreissat & Jraisat, 2019).

## Research Gap

Studies on the Agri-food supply chain have been scarce. Moreover, very few empirical studies have been done to test the model developed for the performance parameters of the Agri-food supply chain in the Indian context.

Research works were conducted in different sectors to understand the Agricultural Supply chain where all report, the involvement of intermediaries that snatch the actual prices from the farmers and offer the products to the customers at a high price.

Parvez (2014) mentioned the need for greater problem-oriented, issue-based research which employs integrated approaches to solve postharvest issues. In understanding and implementing the food supply chain, post-harvest technology, proper linkages must be established in the agriculture and processing sector. It requires significant efforts involving both qualitative and quantitative research projects to further develop these concepts to advance practical applications and academic theories

Many researchers have pointed out the unavailability of reliable secondary data in this area. All of these lead to the conclusion that there is a lack of transparency in supply chains in India which calls for understanding linkages between the various supply chain nodes that are identified through value chain analysis and to establish this, trust, information sharing, and joint problem solving is required among the various stakeholders.

e -choupal model of ITC is an effective solution that creates transparency and solves problems of imbalance in demand and supply and also helps farmers to choose effective methods to improve productivity and also to sell their products at a reasonable price and eliminate maximum intermediaries.

The research is to identify the relationships among the various stakeholders and to bring them to a common platform with the help of information technology that can create a data bank that will provide secondary information along with a balance in demand and supply in terms of production and marketing that reduces black marketing and inflation to a certain level. This data can be useful for further research to improve the infrastructure available and commence new enterprises offering valuable services as per the demand in the market.

### Theoretical (Conceptual) Framework

As the supply chain of agricultural products across the state is in an unorganized manner, most of the transactions take place based on the one-to-one dyadic relationship. The buyer-seller relationship becomes the base of many transactions and this relationship may be evolved out of a lot of characteristic factors which has to be recognized from the previous research works.

To identify the characteristic factors contributing to the buyer-seller dyadic relationship, previous research works were reviewed. Specific keywords were designed to decide on literature that gave precise and updated information. Combining the earlier research works, a conceptual framework is made relating the linkages or relationships between the actors or nodes of the supply chain. Here value chain analysis and material flow determine the major players.

Table I shows the different factors recognized from the literature that contributes to the buyer-seller dyadic relationship

Table I - Factors that contribute to the buyer/seller dyadic relationship

Sl No.	Factor	Supporting Literature	Statement	Contribution to buyer-seller dyadic relationship
1	<u>Information Sharing</u> : mentioned as the coordination and communication that happens between the buyer and seller	Collins (2006), Jraisat (2011), Bhattarai (2013), Pandey et al., (2013), Parvez (2014), Korpela (2015), Kumar & Sharma (2016)	Information sharing between buyer and seller is observed in successful supply chains	Positive
2	<u>Joint Problem solving</u> : recognized due to the sharing of risks and rewards between the buyer	Parvez (2014)	Agri supply chains need to be joined to problem-solving between buyer	Positive

	and seller		and seller	
3	<u>Trust</u> : gained by buyer/seller as a result of satisfaction from the transaction and also the loyalty that developed out of a long-time buyer-seller relationship	Backstrand & Safsten (2005), Ardjosoediro & Goetz, (2007), Jraisat (2011), Parvez (2014), Korpela, (2015), Dadzie et al., (2018)	Trust is one of the major characteristics observed in the selection of a buyer/seller in a transaction	Positive
4	<u>Power</u> : acquired on providing Credit or due to regional monopoly	Backstrand & Safsten, (2005), Ardjosoediro & Goetz, (2007), Korpela, (2015)	Power is one of the factors that decide the buyer/seller in a transaction	Negative

*Source: Review of literature*

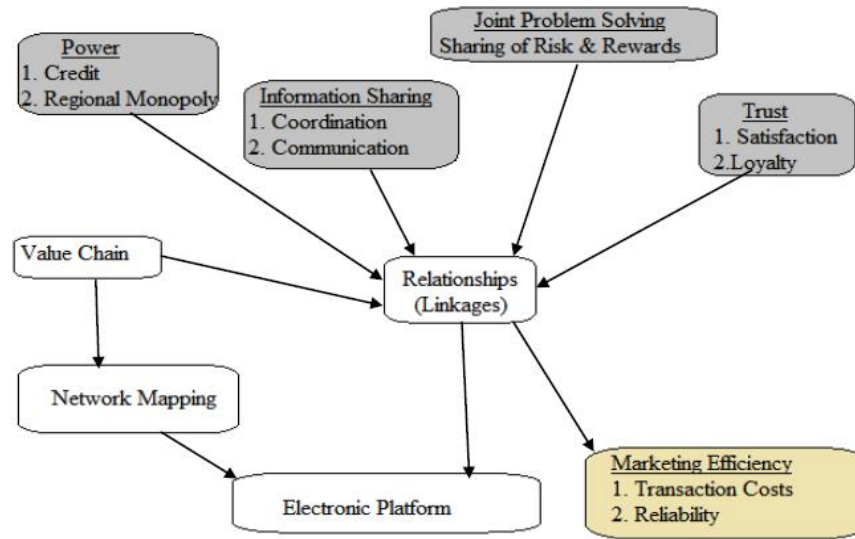
This framework can help to understand the various decisions and transactions that happen across the supply chain of various products. The supply chain management is evaluated by comparing the marketing efficiency of various chains from the producer to the consumer to identify the best channel.

The conceptual framework also suggests an electronic platform to provide information sharing and data backup that can support the transactions in a cost-effective manner that also saves time and provide opportunities to many other people to further enhance the supply system that is in an elementary state to a strong supply network balancing the demand and supply. The electronic platform, with the support of a database, can provide each actor (buyer or seller) with a unique digital identification. It can also record the transactions and details for buyers and sellers to transfer information promptly and can provide alternative dealers with a good rapport when the regular buyers/sellers are not available. It can also be helpful to eliminate intermediaries and black-marketing providing timely information and thereby proceeding to a successful transaction. This again can provide opportunities to value addition processes and industries by recognizing the needs of buyers in a timely and precise manner.

The electronic platform can be helpful to identify the insufficiencies across the supply chain and helps to provide information to rectify the same. It can also be helpful to the researchers and authorities to monitor and collect data to have better and real-time awareness of the supply and marketing of agricultural products. This may also be helpful to the actors (buyers and sellers) to identify the channel that is most efficient to purchase and sell their products.

Fig II shows the Theoretical Framework of the Supply chain Dyadic (buyer-seller) relationship

Fig II: Theoretical Framework of the Supply Chain Dyadic Relationship



### Discussion and Conclusion

The framework proposed above can be used to identify the buyer-seller dyads and thereby develop a supply chain that is stable and reliable. The various stakeholders in the chain will be able to interact and work in a collaborative manner causing a supply chain surplus. A practical version of this model can change farmers from price takers to price seekers. This can aid other stakeholders to persist in their roles. According to Belhadi et al., (2021), buyer-seller relationships moderate the impact of interpersonal trust on sustainable supply chain goals.

### Scope for Further Research

This conceptual framework has to be validated with empirical research works and could be used to understand the relationships between various stakeholders contributing to the sector and thereby can contribute to further research to identify and solve the problems in this sector.

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