

Integration and Effective Supply Chain Management: A Review of Agriculture in Pakistan and China

Safdar Hussain¹ Wasim Ahmed¹ Ambar Rabnawaz² Rana Muhammad Sohail Jafar¹ Haseeb Akhtar³
Wang Guang Ju¹ Sana Ullah¹ Yang Jian Zhou¹

1 College of Economics, Fujian Agriculture and Forestry University, Fuzhou-350002, China

2 Department of Economics, Faculty of Management & Administrative Sciences, University of Sargodha-40100, Pakistan

3 University Institute of Management Sciences, PMAS-Arid Agriculture University, Rawalpindi-46000, Pakistan

Abstract

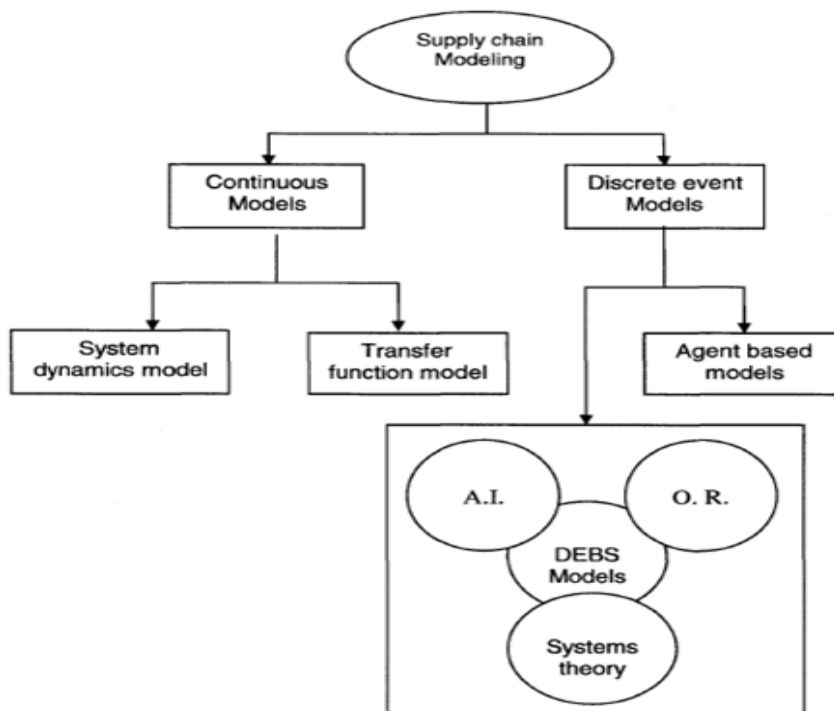
Agriculture is likely to require further strengthening ties between farmers and citizens to improve the efficiency of market systems and their saturation with modern technology. Increasing globalization of agriculture and the ensuing hegemony of supermarkets have brought significant profits and losses. Those on whom the state of the global market of the 21st century, should strive for a just distribution of its burdens, without encroaching on the real fruits of progress, through which millions of people have access to a healthy, diverse and affordable food. Supply chain management can be defined as the integration of key business processes from end user to the original suppliers that provide products, services and information that add value for customers and stakeholders. The integration of all business processes with all stakeholders in the supply chain seems to make no sense apart from being, of course, a major waste of resources. In fact, in certain cases, the enormity of the task may make it impossible to overcome for a company whose supply chain presents a great complexity. Thus, it seems important that companies of all sizes find a way to manage more easily and effectively chains in which they operate. However, particularly in agricultural sector, integration of supply chain process has really brought significant impact on the efficiency of the overall procedures.

Keywords: Supply Chain; Efficiency Measurement; Globalization; Agriculture Sector

Introduction

In this era of fierce global competition, increasing outsourcing and continued disintegration of the traditional vertical firm, the supply chains and the networks made up of multiple firms, are becoming the units of competitive analysis (Chen & Paulraj, 2004; Hult, Ketchen, & Arrfelt, 2007; McCarter & Northcraft, 2007; Miles & Snow, 2007). In many industries, end customers have become the most powerful members of the chain and no longer accept what is pushed through the chain if it does not meet their expectations and demands (Payne, Storbacka, & Frow, 2008; Prahalad & Ramaswamy, 2002; Prahalad & Ramaswamy, 2004; Cova, Dalli, & Zwick, 2011). Current-day customers require more product and service variety, shorter lead times and lower prices in addition to higher quality and more customization.

Riddalls, Bennett, & Tipi (2000) purported that a supply chain is a system of business entities interconnected to each other by flow of materials and goods in one direction, flow of orders in other direction, and flow of information in either one or both the directions. The most generic structure includes goods flowing forward from one echelon to the next till until they reach the end consumer, and the information flowing backwards till it reaches the uppermost echelon such as a supplier. While developing simulation models of a supply chain, it is essential to have a good understanding of the overall supply chain in terms of business characteristics such as performance measures, and production policy (make-to-order/ make-to-stock). It is also important to focus on a specific problem area taking the prevailing environment into consideration. Supply chain modeling can be classified into two basic types, discrete and continuous event models. Discrete event based systems (DEBS) models and agent based models are the two main types of discrete event models. DEBS encompasses jobs and resources. Jobs are defined as units that move from one resource to another where their progress is evaluated. From a supply chain perspective, jobs may represent raw materials that progress through machines and safety stock where their attributes are modified before arriving at the retailer as finished goods (Ho, 1989; Laurikkala, Kassai, Pakkasjärvi, Thesleff, & Itoh, 2003).



DEBS may be considered as a combination of three modeling methods such as artificial intelligence, operation research and systems theory. An informative review of DEBS can be found in work done by Ho (1989). An agent based modeling approach utilizes software components to develop structural elements (e.g. supplier, manufacture, distribution center, transporters) that are needed to model the production and transportation of products, control elements that are used to specify control policies (e.g. inventory policy), and the interaction protocols. In discrete event models, the behavior of models is updated as events occur not simply by passing of time. The approach considers each object as a single item such as assembly of parts at a manufacturing facility. On the other hand, in continuous models the behavior is changed based on information flows, feedbacks, and levels within the systems.

Integrating across the different functional units of the firm is a necessary step toward the competitive advantage of the firm. This might have been sufficient in the past but no longer enough in today's competitive environment. Joint collaboration, coordination, integration and decision making between different functional units within the same organization was required to lower costs, reduce lead times, and differentiate from competitors. The notions of trade-offs and focus on core competencies has led many firms to focus on what they believe are their core functions and processes. The capability to manage the supply chain becomes a critical capability.

As it is important to integrate the different functional units in the vertical firm, so is the managing and virtually and/or physically integrating the different interdependent firms involved in delivering the product or service to the market. Although integration is not a given in a vertical firm, the management has the authority to force the different internal units of the internal supply chain to conform to company objectives via an authoritative decree. This integration of different interdependent units within the same firm is necessary for the firm to be able to compete and succeed. Nonetheless, managing the external supply chain is no less important than managing the internal supply chain. Verily, the task of aligning incentives and objectives along the supply chain and managing the supply chain itself is far more difficult when the chain is made up of independent firms, each with its own objective, cost structure, and culture. It is important to note that supply chain management has become an important and effective means for lowering costs, improving customer service, meeting customer demand, and obtaining competitive advantage. Logistics and supply chain management play a crucial role in food industry (Manzini & Accorsi, 2013).

The integration, collaboration, coordination, and synchronization of the supply chain are critical for creating an agile and responsive supply chain. Customers demand shorter lead times and higher product availability, while at the same time they require lower prices. For example, in order for firms to be able to improve their customer service, firms can hold more inventories but that will increase their costs and their vulnerability to obsolescence, especially for high technology products known for their short life cycles. This problem is magnified in vertically disintegrated supply chains made up of interdependent yet independently owned firms. Each firm may seek its own customer service levels, which may not consider end customers, and hence its accompanying inventory levels that maybe optimal for the firm but lead to suboptimal service levels or higher costs for the entire

chain and consequently for the end customer (Narayanan & Raman, 2004). Therefore, improving the service level provided to the end customer's and lowering the costs naturally require the integration of the supply chain and hence the joint management of inventories, product development projects, and other related activities and costs.

The supply chain literature is abundant with research that points out to the importance of integrated supply chains and how beneficial integration is for improving customer service and lowering total system costs. Verily, integrated and coordinated supply chain management can improve customer service and even indirectly lead to better financial performance. This is achieved through technological advancements which have led towards the visibility of end customers' demand, inventory levels throughout the supply chain, supply capacities, and delivery schedules across the different stages in the supply chains. Thus, information sharing holds great potential for improving supply chain operations if this visibility is used for integration and coordination purpose.

Resources include all the physical assets, the tangible and intangible assets, the routines, the procedures, the knowledge, the reputation, the human capital, the know-how, etc., that the firm owns or can access, can configure, and can deploy and use to implement its competitive strategies. However, sharing information does not automatically lead to better supply chain performance, but coordinated decision making based on the shared information can. Integration of supply chains has the potential to improve and create operational capabilities that differentiate the firm in terms of cost leadership, product and service quality, customization, lead times, flexibility and agility and other competitive strategies (Marsillac & Roh, 2014).

Supply chain integration is also necessary for creating flexibility and agility in the supply chain because integrating product development plans and product designs with the suppliers lead to reduced investments and shorter cycle times (Brandenburg, Govindan, Sarkis, & Seuring, 2014). Integrating with customers gives supply chain members the knowledge of the true end demand and hence enables a more accurate forecasting and planning of responses to meet the demand.

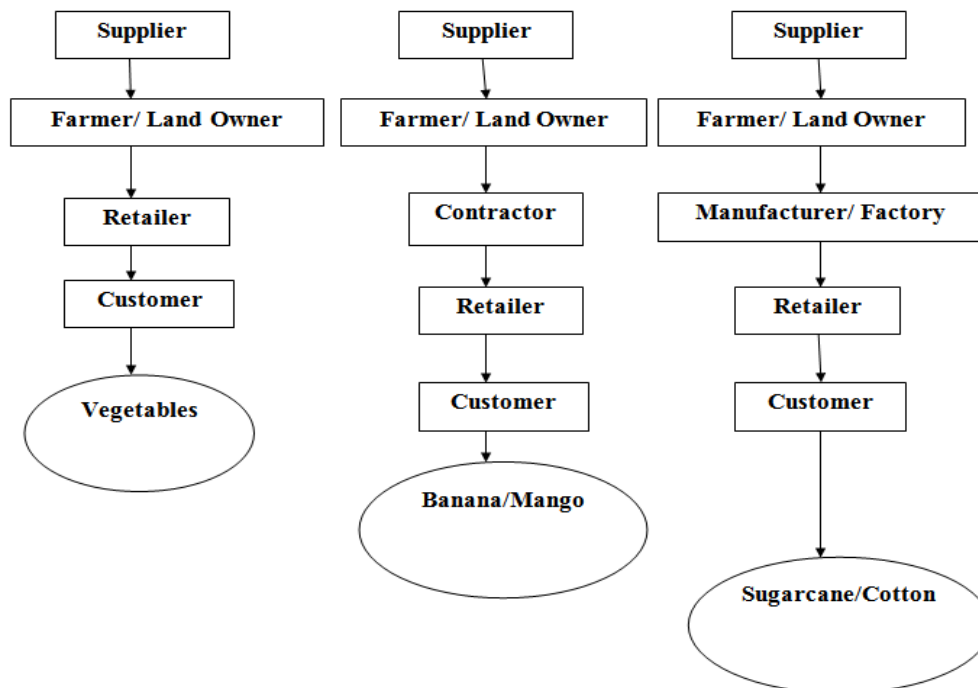
However, this integration must be followed by coordination, collaboration, and alignment of the objectives along the supply chain of the firm. For the supply chain to be able to reap the benefits of integration and obtain competitive advantage against other supply chains (Prajogo & Olhager, 2012). The integration and management of the supply chains has the potential to lead to better performance in terms of costs, and differentiation, especially in manufacturing where large investments in assets and inventory are required. In fact, to manage and integrate with the different chain members, firms are increasingly seeking supply chain integrators who can work with different suppliers and customers in order to integrate and coordinate the interdependent supply chain activities and processes, which results in lower costs and increased customer service. The supply chain literature is abundant with research that points out to the importance of integrated supply chains and how beneficial integration is for improving customer service and lowering total system costs.

Furthermore, supply chain integration is facilitated by advances in information technologies, and inter-firms linkages and its importance is further enhanced by the increasing global competition. An integrated supply chain requires managing the inventory flows, the information flows, the financial flows, and the supply chain relationships (Caridi, Moretto, Perego, & Tumino, 2014).

Supply Chain of Agriculture in Pakistan

In Pakistan numerous crops are being grown, each having its unique characteristics and traits. There are some crops which are being bought directly from the farmer by the retailers like vegetables. Similarly, there are other crops which go through different chains and processes before reaching the end user like Cotton and sugarcane. The problems in the supply chain of agriculture sector in Pakistan in the light of the literature review and the data that was obtained from prior studies identifies that the supply chain in the agriculture sector vary from crop to crop.

It is because every crop is different from another crop. Similarly, there are some crops which are processed through different process till they reach the end consumer like cotton and sugarcane. On the other hand, there are some crops which are sold directly to the retailers by the farmers or the land owners like vegetables. Furthermore, there are also some of the crops which are taken from the farmers or the land owners by the contractors who then sell them to the retailers. The examples of such crops include banana and mango.



Uncertainty is the major threat faced by the agriculture sector of Pakistan. The natural disasters severely affect the crops in Pakistan. There is lack of planning to avoid the natural disasters in Pakistan. This was evident in the floods of the 2010 and the rains of 2011. The floods of 2010, destroyed most of the agricultural land of Sindh, Punjab, Balouchistan and KPK. This also affected our exports too as majority of our exports are directly or indirectly related to the agriculture. Likewise, due to the poor planning by the government the rains of the 2011 also caused a lot of destruction. There was shortage of the basic commodities which were imported on higher rates. There is a need of a proper planning to avoid the natural disasters. Moreover the farmers should also be provided the crop insurance by the government.

Supply Chain of Agriculture in China

China is a large agricultural country and agriculture holds an important position in the development of the national economy. After more than twenty years of reform and development, agriculture and rural economy in China have reached a new stage of development. The agricultural sector in China focuses on the relationship between supply and demand for agricultural products which has had substantial changes, more than a third of the labour force field has shifted to non-agricultural sectors, about half of the income of the farmers comes from these sectors, rural development depends increasingly on the cities and towns and the national economy (Carter, Jing & Baojin, 2003). The Chinese agriculture becomes more and more linked to world agriculture due to these reforms, and the contents of agricultural and rural development have undergone major changes.

Based on this understanding, the new round of rural reform in China will focus on the creation of the system closely related to rural development that will focus on solving prominent problems in the development process of agriculture and rural economy in order to boost the flow of production elements to the agro resources, mobilize the initiative of farmers and accelerate the coordinated economic and social development between urban and rural areas. Supply chain management of agricultural products in the supermarket should not be limited to the negotiation of price. Supply chain management of agricultural products in China (Jin, Ma, Huang, Hu, & Rozelle, 2010). In recent years a large number of agricultural markets have been redone in supermarkets, in the first place - in the cities of the coast of China. Although this transformation was first initiated by the state, not the last role was a change from the consumers' preferences. Efficiency is determined by the success of supermarket sales including fresh agricultural products.

In developed economies, 80-95% of it is sold through supermarkets. In China in the commercialization of grains and vegetables sector is 30%, livestock products and fisheries - more than 50%, fruits - 90%, when such indicators traditional channels can no longer provide effective distribution. But so far China has not developed effective supply chain between farms and urban food market (Carter, Jing & Baojin, 2003). Market fresh produce farms have three levels: wholesale distribution in production, wholesale distribution of point of sale and retail. Supermarkets buy products on 4 channels from the manufacturer, through an intermediary, through cooperatives farmers through wholesale base. Now a mediator is the key player. But direct cooperation manufacturer - supermarket gradually becoming a trend. Farms supply seasonal products or products specific to the region.

Supermarkets began selling typical "peasant" production 7 years ago. But existing logistics schemes do not allow for this activity profitable. Gross profit supermarkets in developed countries from the sale of fresh agricultural products are 20% (Jin, Ma, Huang, Hu & Rozelle, 2010). In China, it is in the range of 0-10%. This is determined by the low final price of products on the shelves, or poor quality, loss of freshness during transportation and lack of a sufficient variety of foods.

The integration, collaboration, coordination, and synchronization of the supply chain are critical for creating an agile and responsive supply chain. Customers demand shorter lead times and higher product availability, while at the same time they require lower prices. For example, in order for firms to be able to improve their customer service, firms can hold more inventories but that will increase their costs and their vulnerability to obsolescence, especially for high technology products known for their short life cycles. This problem is magnified in vertically disintegrated supply chains made up of interdependent yet independently owned firms. Each firm may seek its own customer service levels, which may not consider end customers, and hence its accompanying inventory levels that maybe optimal for the firm but lead to suboptimal service levels or higher costs for the entire chain and consequently for the end customer (Narayanan & Raman, 2004). Therefore, improving the service level provided to the end customer's and lowering the costs naturally require the integration of the supply chain and hence the joint management of inventories, product development projects, and other related activities and costs.

The supply chain literature is abundant with research that points out to the importance of integrated supply chains and how beneficial integration is for improving customer service and lowering total system costs. Verily, integrated and coordinated supply chain management can improve customer service and even indirectly lead to better financial performance. This is achieved through technological advancements which have led towards the visibility of end customers' demand, inventory levels throughout the supply chain, supply capacities, and delivery schedules across the different stages in the supply chains. Thus, information sharing holds great potential for improving supply chain operations if this visibility is used for integration and coordination purpose.

Resources include all the physical assets, the tangible and intangible assets, the routines, the procedures, the knowledge, the reputation, the human capital, the know-how, etc., that the firm owns or can access, can configure, and can deploy and use to implement its competitive strategies. However, sharing information does not automatically lead to better supply chain performance, but coordinated decision making based on the shared information can. Integration of supply chains has the potential to improve and create operational capabilities that differentiate the firm in terms of cost leadership, product and service quality, customization, lead times, flexibility and agility and other competitive strategies (Marsillac & Roh, 2014).

Supply chain integration is also necessary for creating flexibility and agility in the supply chain because integrating product development plans and product designs with the suppliers lead to reduced investments and shorter cycle times (Brandenburg, Govindan, Sarkis, & Seuring, 2014). Integrating with customers gives supply chain members the knowledge of the true end demand and hence enables a more accurate forecasting and planning of responses to meet the demand. However, this integration must be followed by coordination, collaboration, and alignment of the objectives along the supply chain of the firm. For the supply chain to be able to reap the benefits of integration and obtain competitive advantage against other supply chains (Prajogo & Olhager, 2012).

The integration and management of the supply chains has the potential to lead to better performance in terms of costs, and differentiation, especially in manufacturing where large investments in assets and inventory are required (Prajogo & Olhager, 2012). In fact, to manage and integrate with the different chain members, firms are increasingly seeking supply chain integrators who can work with different suppliers and customers in order to integrate and coordinate the interdependent supply chain activities and processes, which results in lower costs and increased customer service. The supply chain literature is abundant with research that points out to the importance of integrated supply chains and how beneficial integration is for improving customer service and lowering total system costs.

Furthermore, supply chain integration is facilitated by advances in information technologies, and inter-firms linkages and its importance is further enhanced by the increasing global competition. An integrated supply chain requires managing the inventory flows, the information flows, the financial flows, and the supply chain relationships (Wu, Wu, Chen & Goh, 2014).

Conclusion

Considering the research topic, and review of the literature so far, it can be anticipated that the integration of supply chain in the field of agriculture has actually served as a path for the smooth flow of different functions involved in agricultural sector. Changes taking place in the world economy in recent decades, largely expanded current understanding of the role of organizations and market structures in a changing competitive environment. Factors such as globalization and internationalization, increasing competition and focus on the end user, as well as the development of information and communication technology and e-commerce could not affect the modern market structure in the field of supply chain management. At the present stage of development - because of widespread globalization and unification economic activity in networks and partnerships - business and markets no longer

limited geographic scope, on the contrary, they are linked in complex global and inter-organizational network. All these changes have affected the way in which the company functions: new organizational model emerged in order to cope with the new business environment. Restructuring of companies and the market becomes part of the global process changes affecting the production, distribution, communication, technology, competition and cooperation. Many factors affect profitability: shortage of global resources, rising energy and fuel costs, and higher global regulations among others. All this without considering the geopolitical events, such as terrorism or natural disasters, are factors of instant chaos in the strategic plans of supply chains. For manufacturing and distribution, power outages are a lesson in uncertainty in the negotiations. To effectively manage this uncertainty, managers must analyze and find answers to the following key questions: 1. Have you identified the main sources of risk and assessed their impact? 2. Does the organization supply chain chaos tolerant to absorb shock? 3. Is the risk management in isolation that an unexpected event or employees actively perform risk mitigation as part of their daily activities done in response is considered? This research work can also be done taking other countries as an example. Furthermore, other countries can also be taken as a case study for the same topic.

References

- Brandenburg, M., Govindan, K., Sarkis, J., & Seuring, S. (2014). Quantitative models for sustainable supply chain management: Developments and directions. *European Journal of Operational Research*, 233(2), 299-312.
- Caridi, M., Moretto, A., Perego, A., & Tumino, A. (2014). The benefits of supply chain visibility: A value assessment model. *International Journal of Production Economics*, 151, 1-19.
- Carter, C. A., Jing, C., & Baojin, C. (2003). Agricultural productivity growth in China: farm level versus aggregate measurement. *China Economic Review*, 14(1), 53-71.
- Chen, I. J., & Paulraj, A. (2004). Towards a theory of supply chain management: the constructs and measurements. *Journal of operations management*, 22(2), 119-150.
- Cova, B., Dalli, D., & Zwick, D. (2011). Critical perspectives on consumers' role as 'producers': Broadening the debate on value co-creation in marketing processes. *Marketing Theory*, 11(3), 231-241.
- Ho, Y.-C. (1989). Introduction to special issue on dynamics of discrete event systems. *Proceedings of the IEEE*, 77(1), 3-6.
- Hult, G. T. M., Ketchen, D. J., & Arrfelt, M. (2007). Strategic supply chain management: Improving performance through a culture of competitiveness and knowledge development. *Strategic management journal*, 28(10), 1035-1052.
- Jin, S., Ma, H., Huang, J., Hu, R., & Rozelle, S. (2010). Productivity, efficiency and technical change: measuring the performance of China's transforming agriculture. *Journal of Productivity Analysis*, 33(3), 191-207.
- Laurikkala, J., Kassai, Y., Pakkasjärvi, L., Thesleff, I., & Itoh, N. (2003). Identification of a secreted BMP antagonist, ectodin, integrating BMP, FGF, and SHH signals from the tooth enamel knot. *Developmental biology*, 264(1), 91-105.
- Manzini, R., & Accorsi, R. (2013). The new conceptual framework for food supply chain assessment. *Journal of Food Engineering*, 115(2), 251-263.
- Marsillac, E., & Roh, J. J. (2014). Connecting product design, process and supply chain decisions to strengthen global supply chain capabilities. *International Journal of Production Economics*, 147, 317-329.
- McCarter, M. W., & Northcraft, G. B. (2007). Happy together?: Insights and implications of viewing managed supply chains as a social dilemma. *Journal of operations management*, 25(2), 498-511.
- Miles, R. E., & Snow, C. C. (2007). Organization theory and supply chain management: An evolving research perspective. *Journal of operations management*, 25(2), 459-463.
- Narayanan, V., & Raman, A. (2004). Aligning incentives in supply chains. *Harvard business review*, 82(11), 94-102, 149.
- Payne, A. F., Storbacka, K., & Frow, P. (2008). Managing the co-creation of value. *Journal of the academy of marketing science*, 36(1), 83-96.
- Prahalad, C. K., & Ramaswamy, V. (2002). The co-creation connection. *Strategy and Business*, 50-61.
- Prahalad, C. K., & Ramaswamy, V. (2004). Co - creation experiences: The next practice in value creation. *Journal of interactive marketing*, 18(3), 5-14.
- Prajogo, D., & Olhager, J. (2012). Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration. *International Journal of Production Economics*, 135(1), 514-522.
- Riddalls, C., Bennett, S., & Tipi, N. S. (2000). Modelling the dynamics of supply chains. *International Journal of Systems Science*, 31(8), 969-976.
- Wu, T., Wu, Y.-C. J., Chen, Y. J., & Goh, M. (2014). Aligning supply chain strategy with corporate environmental strategy: A contingency approach. *International Journal of Production Economics*, 147, 220-229.