Development of Holistic Framework Incorporating Collaboration, Supply-Demand Synchronization, Traceability and Vertical Integration in Agri-Food Supply Chain

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ABSTRACT

Successful implementation of food supply chains in improving the productivity and operational efficiency by some companies made many other firms and researchers courteous about this fast developing field. For successful strategies, organizations in agri-food business are aiming to bring all its stakeholders in close cooperation. The agri-food supply chain aims at optimal warehousing and location design, supply-demand synchronization, checking price variations and ultimately minimizing waste and improving productivity at every stage leveraging Information Technology (IT). This research reviews the supply chain status in agri-food sector, categorizes available literature, assesses the influential articles, and proposes the holistic framework in agri-food supply chain. From the literature review, it is observed that the research articles have addressed agri-food supply chain up to a certain point and confined to the apt ideas of supply projections, demand projections, supply-demand disparity, traceability, collaborations etc. There is a need for extensive research to reconsider warehouse and location design, supply-demand projections and gap analysis, transshipment strategies and traceability in an integrated manner. The present study proposes holistic framework addressing the issues of supply-demand synchronization, warehouse design, transportation optimization, traceability, vertical integration and farmer’s credit facility.

Keywords: Agri-Food Supply Chain, Collaboration, Information Technology, Integration, Synchronization, Traceability

DOI: 10.4018/jisscm.2011100102
INTRODUCTION

Global supply chain forum (GSCF) has defined the supply chain management as “The integration of key business processes from end user through original suppliers providing products, services and information that add value for customer and other stakeholders”, (Subramanya & Sharma, 2008). In supply chain management-information, product and services flow in one direction and cash flows in opposite direction. The supply chain management is the supreme concept and greatly emphasized since 1980’s to revolutionize businesses. With the advances in information and communication technology (ICT), manufacturing technology and biotechnology- logistical activities are subjected to greater scrutiny. The focus at the end of twentieth century has shifted from productivity concerns arising from lack of technology to the compatibility of firm’s supply chain. Following citations by various researchers emphasize the importance of supply chain and its applications in various fields.

Marketplace is greatly excited about how various supply chain software packages can integrate the operations of a firm’s supply chain and improve its efficiency and competitiveness (Pant et al., 2003). Companies today are well equipped with accessibility to internet technology and exploring new ways of doing business (Mukhtar et al., 2009). Information sharing is the backbone of supply chain management and IT tools like Electronic Data Interchange (EDI), e-procurement, Enterprise Resource Planning (ERP), etc. help to improve flow of information along supply chain links. The concept known as ‘Digital Manufacturing’ or ‘Manufacturing at Door Step’ evolved in early nineties is the outcome of improved means of information and communication technology (ICT). Development of simulation, analysis and forecasting tools based on IT helps to predict future with past data. We are now better equipped to plan our resources and improve the productivities through supply chain management approach. Bi and Lin (2009) used Radio Frequency Identification (RFID) and internet technologies to solve a real world supply chain management problems. In European Union (EU), agriculture policy is meant to reinforce the link between primary production, the processing industry and other economic activities around agriculture as a part of strategy for improving jobs in primary production as well as in industries and companies depending on it. According to Leat and Revoredo-Giha (2008) such linkage needs an understanding of the attitudes and circumstances of the various supply chain participants.

Mikkola (2008) said that the relation mix, including social relations, needs to be studied empirically and contextually from the actor’s point of view. In recent years, manufacturers, distributors and retailers are exploring the new ways for working together (Aghazadeh, 2004). Green isle, a business firm is facing stiff problem to maintain its status of preferred supplier through improved customer service, stronger support for its branded products and to deliver process efficiencies (Ryder & Fearne, 2003). In last decade food crises have had a great impact on food industry. There is an imperative need for food quality across the supply chain, which partly relies on physical traceability throughout chain (Kelepouris et al., 2007). Concentration patterns at different levels in the supply chain in retailing and manufacturing have led to changes in the balance of power in the supply chain, with high levels of dynamism, efficiency and effectiveness at the retailer end of value chain often contrasting with more fragmented structures in primary production (Shaw & Gibbs, 1995). Supply chain management has become a major strategy for the guaranteed reliable sourcing of fresh vegetables to urban supermarkets in emerging East Asian economies. Procurement of vegetables requires high frequency, constant delivery and stable quality. Delivery arrangements are usually based on easily observable output characteristics (volume, size and color) but also include detailed product handling and delivery specifications (input, applications and packaging). In the latter case, to reduce buyers uncertainties regarding desired product attributes (quality, safety and freshness) they try to enforce management decisions of grow-
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