

# INFORMATION TECHNOLOGY AND KNOWLEDGE MANAGEMENT TO IMPROVE THE INDIAN AGRI-BUSINESS SUPPLY CHAIN

*C. Sagunthala*

*Assistant Professor - MBA - Karpagam University, Coimbatore*

*R. Sukesh*

*II year MBA – Karpagam University*

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## Abstract

Indian agriculture is a complex enterprise involving millions of small and marginal farmers. Agriculture in India is the most important sector for food security and socio-economic development. Agriculture accounted for about 18 per cent of the GDP and employed about 50% of the country's population. As agriculture has become more complex, farmers' access to reliable, timely, and relevant information has become increasingly important. Farmers require access to more varied, multisource and context-specific information, related not only to best practices and technologies for crop production and weather, but also to information about post-harvest aspects, including processing, marketing, storage, and handling. An effective agricultural knowledge management system with effective Information Technology can trigger continuous innovations in overall development of agriculture. Information Technology can revolutionize Indian farming sector and can benefit all farmers, including small land holders, marginalized and poor farmers. This article attempts to express the current status of the infrastructure with respect to the use of information technology in agriculture and study the importance of knowledge management and information technology in agricultural infrastructure on agriculture supply chain.

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## Introduction

Indian agriculture is a complex enterprise involving millions of small and marginal farmers. India has experienced a remarkable growth in the production of various agricultural commodities over the last four decades. Technological intervention in the mid-1960s contributed significantly towards bringing the country from deficit to surplus stage in food grain production. Growth and development of agricultural supply chains for local and external markets can be considered as a powerful tool for poverty reduction and to fight against the challenge of food-security in developing countries like India. This particularly makes a strong case in India where farmers are able to produce agricultural products, such as fresh fruits and vegetables that have higher potential for value addition as compared to conventional crops, and if access is made available to processing, marketing and distribution, which could enhance the value of the final products.

India's consumer class is growing rapidly and becoming more and more attracted towards the availability of fresh, convenient, palatable, nutritious and safe food. To meet these requirements agricultural sector needs intensive and new farming techniques to address new challenges for sustainable production, processing practices and promotes a balanced approach to the problems of food quality, safety and good environmental management. For strengthening agricultural production and productivity, the governments had taken various initiatives, most of which were on the production side to ensure food security in the country, but several studies suggest that the reform policy of government only focused on the price measures and ignored the infrastructure and institutional changes which have caused an

unfavorable effect on agricultural growth in the recent decades. A policy analysis of agricultural system shows that there is multiplicity and duplicity of rules and regulations dealing with various components of supply chain in agriculture. Lack of coordination among these, again, leads to the poor alliance and collaboration supply chain, which in turn leads to the inefficient product and information flow.

Thus, this paper covers important aspects of agriculture supply chain in India, the role of ICTs in supply chain management (SCM) with Knowledge management model in agribusiness supply chain with respect to the present infrastructure facilities.

### **Objectives of the Study**

- To study current status of infrastructure in Indian agriculture
- To study the importance of knowledge management and information technology in agricultural infrastructure on agriculture supply chain

### **Current Status in the Agricultural Supply Chain**

A close look at flow of agricultural commodities in India suggests that there are multiple routes, most of which are not recorded. The agricultural production is broadly categorized into these sub-systems—input supply, production, processing, sales and distribution to consumer and quality and food safety measures. Due to lack of coordination between various sub-systems, the agriculture operates inefficiently at each stage of supply chain. The production level, farmers' usually does not make decisions based on market trends in a planned manner, nor do they plan the use of resources in appropriate way. There is little or no alignment between the growing for the agricultural commodities in the market and the production and supply of these commodities. The agribusiness food processing industry is facing constraints and barrier such as non-availability of adequate critical infrastructure facilities.

The organized procurement or flows of agricultural commodities are quite low and primarily takes place in form of government market intervention scheme coupled with few special procurement licenses to private organizations and contract farming arrangements. In recent decades, the government has introduced a number of initiatives to strengthen market linkage and diversification in the agricultural production system. Reform in agricultural marketing system to ensure private participation for establishing direct linkage with farmers, capacity building and infrastructure development in regulated markets, extension of road network and transportation, storage and warehousing, market intelligence system and introduction of commodity trading by establishing commodity exchanges are some important areas of interventions, but changes are taking place at very slow pace. The inclination of leading corporate organizations in India towards investing in agribusiness chain is very vibrant, and number of organizations, for example, Hindustan Unilever Limited (HUL) and India Tobacco Company Limited (ITC), have already entered or are planning to enter agribusiness activities. This trend is creating a new business environment for agribusiness operations.

The new corporate entries are not just participating in chain to source their required raw material (mainly indirectly from the farming community), but are more focusing in the primary source of agricultural produce. In this context, the development of direct linkages with farmers will attain greater importance. It has been very well realized by these corporate participants in the agribusiness chain the leadership in food business requires a keen understanding of supply chain for agricultural produce. The participants should have clear strategies for sourcing raw material and distributing the final products to potential consumers efficiently and effectively.

### **Information and Communication Technologies (ICT) in Indian Agriculture**

The deployment of ICT in agriculture is a socio-technical process. Modern agriculture is knowledge-intensive and increasingly information-driven; each participant on supply chain thrives on timely and accurate information for various decisions. ICT in agriculture is an emerging field focusing on the enhancement of agricultural and rural development in India. It involves application of innovative ways to use Information & Communication Technologies (ICT) in the rural domain. The advancements in ICT can be utilized for providing accurate, timely, relevant information and services to the farmers, thereby facilitating an environment for more remunerative agriculture. Given the development scenario in Indian Agriculture, ICT movement is still evolving.

The implementation of information and communication technologies (ICTs) proposes three unique strategies: (a) a close vertical supply chain network for agribusiness enterprises; (b) an open chain network with dynamically evolving partners and supply chain situation for public, non-governmental and multilateral organization and (c) a spatial data services network to address the natural resource management and its sustainability concerns. Therefore, knowledge and information are important factors for accelerating agricultural development by increasing agricultural production and improving marketing and distribution efficiencies. In addition to connecting small farmers and artisans to markets, ICTs also facilitate most agricultural decisions; what to cultivate, how to cultivate and harvest, when and where to sell and what price to maximize the returns. Effective decision making related to all these aspects ultimately determines efficiency in supply chain.

The fast and innovative development in ICTs can provide immense opportunity to public and private sector agencies to integrate these technologies in their supply chain systems. ICTs are extremely important for dissemination of information, provision of services, enabling various transaction and awareness creating among rural masses far removed from government. ICTs provide a modern, effective and speedy mode of interaction and communication that conveys new resources of knowledge and information to the society. ICT technologies can be used to strengthen communities and farmer organizations strengthen their own capacities and better represent their constituencies.

### **Collaborated IT and Knowledge Model for Agricultural Supply Chain**

Indian agriculture is a complex enterprise involving millions of small and marginal farmers. Many of them are illiterate, resource-poor and have little or no access to modern technologies. Farmers are still more comfortable growing the traditional crops, particularly rice and wheat, as they have already discovered the market for their marketable surplus—be it government procurement arrangement or private local traders. But the shift in market demand needs a balancing approach to meet the supply of deficit commodities such as pulses, oil seeds and high-value food items. This balancing of demand and supply can be ensured by strengthening buyer–supply relationships in an efficient way, and disseminating accurate and timely information to all the participants of the business chain. The major issue in Indian agribusiness supply chain is lack of integration between different sub-systems of the chain. Each participant in the chain acts as an independent agent with a very low level of business relationship.

As supply chain network of system and sub-system in traditional agriculture explore that farmers produce the agricultural product by getting input material from input companies and most of time farmers has to bear the brunt of expenses of production process. Chain also suggests that mandis and wholesalers act as prime middle intermediaries, who receive produce

from farmers via warehouse and processing units. Then produce or processed produce being distributed for retail market and institutional distribution which eventually lead to ultimate consumer. Collaboration and relationship management along the chain is key instrument for integrating the supply chain system and the ability to establish effective relationship is necessary to reach supply chain success.

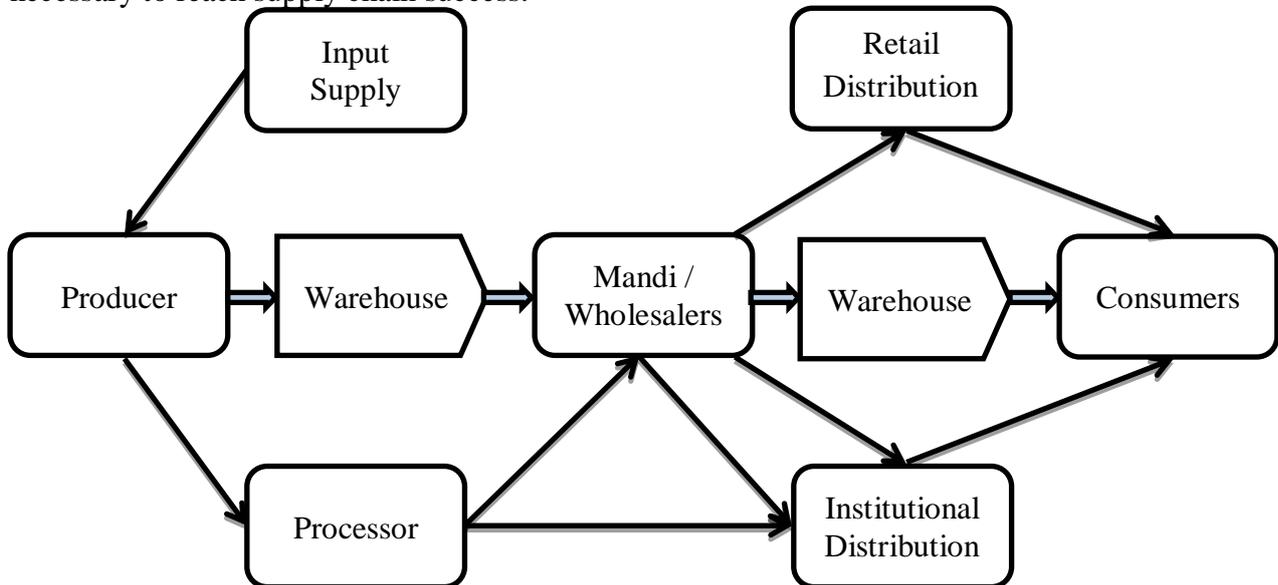


Fig 1. Traditional Agricultural Supply Chain Network

Indian agriculture is a complex enterprise involving millions of small and marginal farmers. Many of them are illiterate, resource-poor and have little or no access to modern technologies Knowledge management (KM) is therefore a very challenging task in Indian agriculture. Unless everyone connected with agriculture is brought to a common platform for sharing and refining information, finding solutions to local problems through crowd sourcing information is not easy. With the recent advances in information and communication technologies (ICTs), connecting people on a common knowledge platform is not that difficult in technical terms. Knowledge management (KM) generally refers to the process of generating, capturing and disseminating knowledge. ICTs have been extensively used in information dissemination in local language to farmers and in training farming communities in better agricultural practices.

Several empirical studies has recognized the increase need for collaboration is a way to construct even more efficient and responsive supply chains, in order to deliver exceptional value to customers.

There are two major pillars of supply chain collaboration - the design and governance of supply chain activities, and the establishment and maintenance of supply chain relationship. By going through framework of supply chain collaboration, it is very much visible that supply chain collaboration provides an opportunity for integration among all the stockholders in agricultural supply chain system. It gives the picture that through supply chain collaboration a system can be established in which governance of SCM activities can be achieved by sharing information and in-depth coordination among partners and activities.

Same time maintenance of SCM can established through effective management of power via trust, rewards, risk and dependence among all the partners. The success of collaboration depends largely on the physical structureof the chain flow and the way relationships among various channel members are maintained in the system. An efficient

physical flow system needs a governance mechanism for organizing and controlling the activities as per design.

The design of supply chain governance system depends on an efficient flow of information on various aspects of the chain, such as numbers of participants required at each stage, that is. Selection of partners; types of goods and services required to strengthen the relationship, that is, width of supply chain activity and level of decision-taking relationship required.

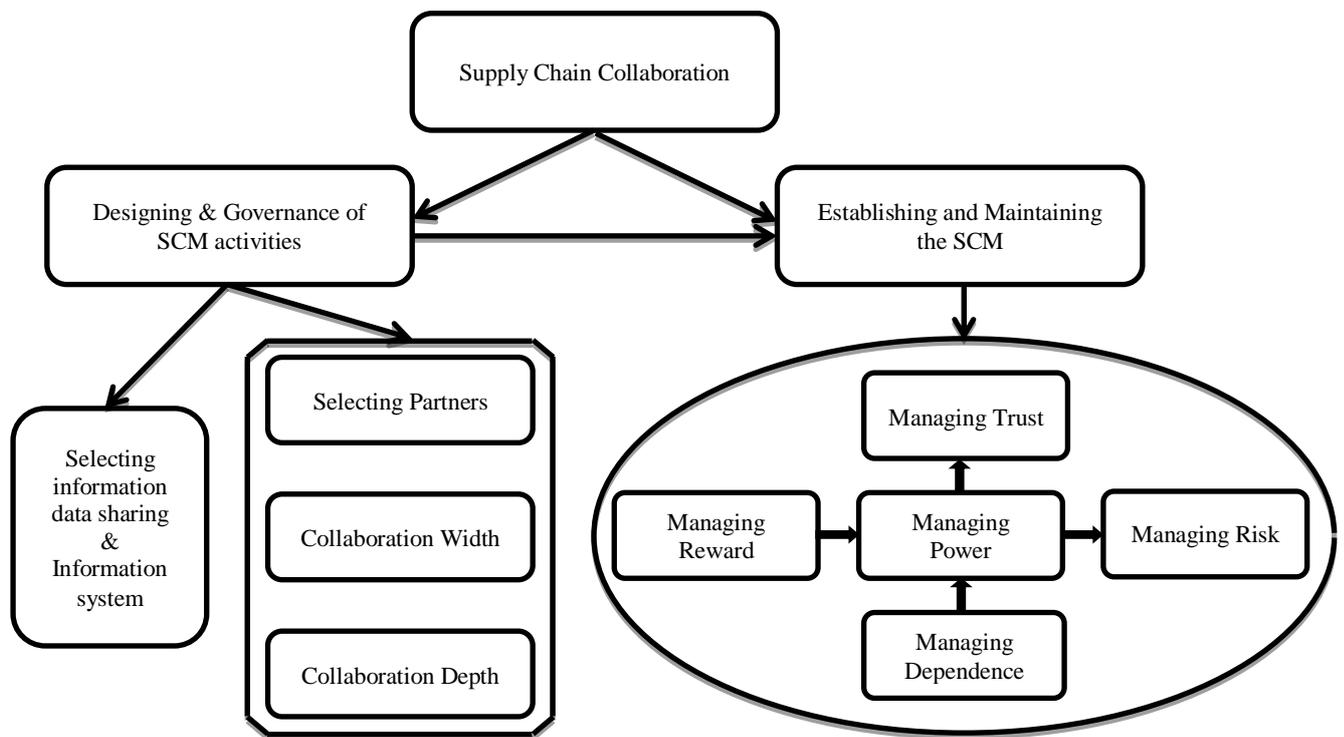


Fig 2. Framework of Supply Chain Collaboration

The sustainability of supply chain collaboration largely depends on how relationship are established and maintained among the chain partners. Generally, business relationships are maintained by adopting two basic approaches: behavioral and economic. A balance between risk and reward considered to be an important economic factor for enhancing relationship. Similarly, trust among channel partners, power share and interdependence are other important factors for enhancing relationship in the supply chain system.

**Conclusion**

The ability to manage knowledge effectively is the most important factor in enhancing the productivity and competitiveness of Indian agriculture. Knowledge management is important for all stakeholders in the Agricultural Innovation System. ICTs with Knowledge Management can support development and sharing of appropriate and relevant content for researchers, farmers, industry, traders, and policy makers. The article concludes that ICT and Knowledge model plays a very important role for the development and contemporary issues of agriculture supply chain. IT and knowledge management can play a major role in facilitating the processes of integration and transformation of rural India to meet the challenges.

## Suggestions

IT and efficient knowledge management should be used for maintaining an updated and enriched database of region specific agricultural information and timely dissemination of technological information pertaining to soil enrichment, seed selection, actions relating to arrival of monsoon, etc., to the farmers in the field and reporting from farmers' feedback to the research system is one of the critical inputs in transfer of agriculture technology and also need of hour.

In addition, information regarding agricultural products, demand–supply status in respect of different products and the current price should be made available online to the farmers for taking timely decisions on crop product diversification strategies and positioning of the same in right market to get optimum revenue.

The deployment of ICT in agriculture is a socio-technical process. Even the best technology can fail if the user group does not have the capacity (or the motivation) to use the technology. Hence, at every step of deployment of ICTs for KM, it is critical to stay connected to the user group to understand their responses to the technology deployed, both in terms of its ease of use as well as in terms of whether it really meets a hitherto unmet need of the user. So the educational and professional IT based institutions should take up the responsibility for guiding the use of IT as a tool and make it available to the farmers.

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