



LOGISTICS AND SUPPLY CHAIN SYSTEM OF AGRICULTURAL PRODUCTS OF ASSAM

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Article History: Received: 01.02.2023

Revised: 07.03.2023

Accepted: 10.04.2023

Abstract

In India, farmers still lack real-time information about consumers, market demand and prices, and with the growth of retail and free world trade organized by existing intermediaries in traditional supply chains, agriculture is highly knowledge-intensive, commercialized, competitive, globalized, digitized, and need to rebuild its competitiveness. In the agricultural sector, efficient supply chains benefit both farmers as well as consumers. Also, urban areas are crowded with low quality of life and highly saturated markets. Almost 60% of India's population lives in rural areas, and projections show that these figures will remain the same by 2050. There will be about. 800 million people live in rural India in the 2040-50s, providing the scale and market for the commodity supply chain to thrive. In this way, it is necessary to turn rural India into a group of sophisticated Bibran activity centers. Innovation and transformation are required at all levels of the product, process, business model, and service model. This study mainly aims to find various aspects of the supply chain of agricultural production in Assam and India as a whole. Assam can produce many types of agricultural products, but it has not yet reached an ideal position in terms of supply and distribution.

Keywords - Supply Chain, Organized Retailing, Global Trade, Agricultural Outputs

Introduction

India is an agriculture-based economy, and the agricultural sector continues to provide jobs to more than half of the country's large population. However, the agriculture and Allied sectors contribute only 2016-17 to the country's gross domestic product (Economic Survey Report 28-18). According to the FAO UN, almost 11% (1.5 billion hectares) of the Earth's surface (13.4 billion hectares) is currently used for crop production. India is the world's third largest producer of food grains, the second largest producer of fruits and vegetables, and the largest producer of milk; it also has the largest number of livestock. In addition to that, a country fundamentally

strong in agro-climatic regions and a range of agricultural production, very hardworking farmers, science and technology and one of the highest growth rates and one of the largest economies in the world. According to the World Bank (2015), 75% of the world's poor live in rural areas – 883mn people rely on agriculture as their main source of income, at a poverty level of us\$1 per day. Agricultural growth can be an effective tool in reducing rural poverty, economic growth and strengthening agricultural value chains in countries like India, is an agriculture-based economy, and the agricultural sector may continue to provide jobs to more than half of the country's adult population. However, the agriculture

and Allied sectors contribute only 28-18 to the country's gross domestic product (Economic Survey Report 2016-17). Currently, almost 13.4 billion hectares of the Earth's surface (11 billion hectares) are used for crop production, according to the FAO UN. India is the world's third largest producer of food grains, the second largest producer of fruits and vegetables, and the largest producer of milk; it also has the largest number of livestock. In addition to that, a fundamentally strong country in agro-climatic regions and a range of agricultural production, very hard-working farmers, one of the highest growth rates and one of the largest economies in the world. According to the World Bank (2015), 75% of the world's poor live in rural areas – 883mn people rely on agriculture as their main source of income, at a poverty level of us\$1 per day. Agricultural growth could be an effective tool in reducing rural poverty, economic growth and strengthening agricultural value chains in countries like India

Need for the study

India's rural market has provided opportunities that even large companies trying to become high-performance businesses can't afford to ignore. However, the volume and size of these markets (1.3 billion of the country's 4.3 billion people live in rural areas) have been offset by concerns about rural demand. In industrial and academic estimates, India's logistics and supply chain system spending is about 13% of gross domestic product (GDP). Global estimates for this vary, about 13% of China's GDP and about 9% of the US's GDP. According to the NTDP report, 2014, transport costs in India account for almost 40% of production costs, with most goods being moved by road. Trucking accounts for almost 70% of transportation and 60% of all logistics costs. The road is followed by a railway, and eventually coastal transport takes place. Of the total logistics costs, transportation accounts for 39%, and warehousing, packaging and

inventory account for 24% of the total cost. The rise in logistics costs is mainly due to the lack of infrastructure equipment. Inadequate distribution channels and infrastructure bottlenecks limit the range of products reaching consumers across the country. Over the years, India has developed the world's largest road network, but its infrastructure facilities are not comparable to developed countries. Rural trends create requirements for rethinking manufacturing and distribution footprints for larger centers of demand. Potential benefits include cost efficiency, shorter logistics chains, and increased product freshness. Therefore, India's rural supply chain is one of the most important aspects in the current scenario.¹ And with about 60% of India's population is rural, and about 800 million people are expected to live in rural India in the 2040-50s, it is expected that India's rural supply chain will be the next big thing.

Logistics and Supply Chain Management

Logistics and SCM are often used interchangeably, but there are subtle differences between the two. The term "supply chain management" is used by Booz, Allen and Hamilton Inc. It was coined in 1982 by Keith Oliver. But discipline and practice have existed for centuries. "Logistics" had a military origin and was associated with the movement of troops and their goods on the battlefield. But like many other technologies and terms, it gradually enters the business dictionary and has become synonymous with a range of activities ranging from the procurement of raw materials to the delivery of the final polished goods to consumers. While SCM is strategic in nature, logistics is more operations-oriented. Failure of a company's supply chain performance due to inefficient logistics activities can result in competitive losses and ultimately lead to collapse. Logistics plays an important role in the pursuit of excellence in the supply chain

and leads to improvement of organizational performance.

An agricultural supply chain is defined as an interlocking chain from the acquisition, processing, transportation, distribution and delivery of agricultural products to the final customer. An agricultural supply chain is a supply and demand network that includes upstream and downstream farmers, manufacturers, wholesalers, retailers and end consumers.

Why Agricultural Logistics & SCM?

The rural market is small and corresponds to a clear number of nearby households. Traders in these markets are mainly farmers themselves with well-established small circles of customers. Access to the local market is easy, but the supply in the market is very difficult and fluctuates seasonally. Agricultural products play a pivotal role in global strategies to meet consumer demand. However, diverse weather conditions, alternative uses for agricultural production, unstable global food demand, and instability in commodity prices lead to a fragile supply of agricultural products. The agricultural supply chain has emerged as an important issue for both the state and the international community.

Agricultural logistics and supply chains are affected by a number of complex and interrelated factors and issues, including land tenure, farm size, market structure, information flow, availability financial and banking facilities, available logistics infrastructure and services, government policies and levels of public and private participation. 1. One of the most important bottlenecks in agricultural products is the complexity and cost efficiency of logistics operations. Modern agricultural production networks require a multi-level supply chain management (SCM) approach as the flow of goods and information increases. Now it is becoming a globally interconnected system of complex relationships, affecting the way food is

produced, processed and delivered (Burch & Lawrence, 2005).

How Agri-Supply Chain it is different from other Supply Chain

Many characteristics of agricultural products give the right to the supply chain of agricultural products with some characteristics that are different from those of industrial supply chains:

- **Perishables of fresh agricultural products**

Agricultural products in circulation, for example, require classification, processing, sorting, etc. During the process, art of produce storage and transportation needs specific containers and equipment, such as need for dedicated equipment for dairy products logistics. In addition, limited by season, climate and other natural conditions, the production cycle of agricultural products is much longer compared with manufactured goods, investment in agricultural production has a longer payback period.

- **High market uncertainty**

Agricultural production and consumption dispersion will be difficult, market information very scattered, to fully grasp the market supply and demand information and competitors, and partner information. Listed agricultural products as if in a strong seasonal agricultural production, short time, market price fluctuations can be large, is difficult to adjust, in addition to fresh agricultural products fresh food, timely adjustment limiting agricultural products between different regions and seasons, it will be more risk agricultural products supply chain.

- **The disequilibrium of market forces**

Farmers in developed countries such as the United States are usually landowners, but our country is based on the household management of small farmers, and most

agricultural products are produced by scattered farmers. This compared with other market players, scattered farmers market strength is still very weak. For small-scale farmers as the main body of the country, without "large enterprises in cooperative organizations and joint home-grown farmers", agricultural management integration is just an empty story.

- **Agricultural products' supply chain of logistics demand is higher**

Agricultural production is mainly regional, and the demand for people is diverse, so it is necessary to trade the flow between different regions and farms with fresh, fresh nature. Especially fresh produce, higher requirements for logistics are distributed, this difference is clearly interested in the work of logistics distribution. In order to improve the level of logistics of agricultural products, we need to reduce the supply chain of agricultural products and implement professional logistics management.

Review of Literature

Literary reviews are the basis of the understanding of the subject. Since the literature review covers many areas related to the nature of the presented research subject, it includes agriculture, food management, supply chain approaches, information technology and supply chain interfaces. Content analysis is a research tool that determines the presence of a particular word or theory in a text or set of texts. This article covers articles published in various scientific databases such as Springer, Taylor & Francis, J-Stor, Open Access Journal, Emerald, and ScienDirect.

Sachan (2005) also cited agriculture as essentially a fragmented and unorganized sector involving diverse stakeholders such as input suppliers, farmers, traders, commission agents, processors and distributors. Compared to developed countries, India's agricultural supply chain

is much more complex and difficult to manage due to its unorganized nature and numerous intermediaries. About 25-30 percent of agricultural production is wasted because of improper handling and storage, pest infestation, poor logistics, inadequate storage and lack of transportation infrastructure.

Sahay and Mohan, (2003) found that another important reason for inefficient supply chains is the inadequacy of logistics infrastructure such as roads, railways, airports, ports, information technology, communications and energy production, which is simply poor compared to other developed and developing countries.

Ahya, (2006), said that agricultural supply chains suffer from inefficiencies at every stage. The lack of adequate infrastructure to procure produce from the farm gates to consumers has led to huge losses in transit. While many layers of intermediaries enjoy high margins, farmers benefit very little from rising prices. In addition, farmers are forced to sell their produce at disposable prices in times of bumper crops. This has also led to a large markup in pricing due to an extra layer of intermediaries.

Mittal (2007) reports that about 60% of quality is lost in India's perishable food supply chain while agricultural products are transported from farms to end consumers. Efficient supply chain management of practices in the perishable food supply chain certainly benefits in terms of low prices to customers and high revenues to producers.

Deshingkar, (2003) found that post-harvest losses vary significantly between commodities and varieties, in different regions and seasons. Waste levels are as high as 24-40 percent in India, but as low as 4-6 percent in developed countries.

A study by Ziggers & Trienekens (1999) stated that the six basic requirements for an efficient supply chain between perishable food producers and key retail

customers include scale of operations, strategic alliances, production flexibility, supply continuity, quality control and communication.

Lambert and Cooper, (2000) found that agri-supply chains are also an economic system that distributes profits and distributes risks among participants. In this way, the supply chain can implement internal mechanisms and provide incentives for the entire chain to ensure the timely performance of production and delivery commitments.

Objectives of the Study

Agriculture is the most important sector of India's economy. The entire supply chain of agricultural production in India has a major problem of post-harvest loss and waste due to various factors. Because identifying problems and challenges can pave the way for planning and implementing effective mitigation strategies. Therefore, this study has been carried out for the following purposes:

1. Assess the importance of supply chain and logistics in agriculture in India.
2. Identify factors affecting the supply chain of agricultural production in India.
3. Explore the issues, importance and scope of further research in agricultural logistics and supply chains

Methodology

Descriptive studies have been used for this study. Agricultural production-only supply chains have been described, and attempts have been made to identify factors affecting the sector's supply chain. The scope of the study is limited to India only. This study is based on the conceptual framework of the supply chain and its impact on rural life and contributes to the development of Northeast India in general and Assam. This study conducted a thorough review of the available basic and modern literature to identify issues affecting the agricultural supply chain. Research database of emeralds, etc.

(www.emeraldinsight.com), Ebusco (Search.ebscohost.com), Research Gate, Wiley (www.wiley.com), Springer (www.springerlink.com and Elsevier (www.sciencedirect.com I searched for related papers.

About agriculture in Assam

The province, Assam, is rich in water resources and has a vast area of fertile land. As the highest tea producer in the country, during the 2018-19 year, the production of tea in the state reached 7 billion 1.35 million kilograms. Agriculture is the main contributor to the state economy. It also provides a living for a significant proportion of the state's population. The two main rivers Brahmaputra and Barak support good agro-climatic conditions of the state, which supports the cultivation of plantation crops and a wide range of horticultural crops, including various fruits and vegetables, flowers, spices, medicinal and aromatic plants, nut crops and tuber crops. 1. Pineapple, banana, cauliflower, broccoli, rose, rice, papaya, sugar cane, turmeric, jute, potato and bougainvillea are among the high-yielding varieties of horticultural crops in Assam. However, the state is still in a backward position in using these technologies like other Indian states. Every year, especially during the rainy season (5-8 months), Brahmaputra and its tributaries cause terrible flooding almost throughout the valley. And this flood will destroy everything, from people's lives to agriculture. In addition, access to the Indian mainland market is still not smooth due to geographical location and inadequate means of roads and transportation.

Issues and Challenges in the Supply Chain of Agricultural output in India

From secondary sources, this study identifies factors affecting the supply chain of agricultural production in India. Input or inward supply chains are not covered in

this study. The main factors identified from the survey are related to the categories of infrastructure, processing and added value, finance and information. Some of the key identified key challenges are lack of infrastructure facilities, low processing and added value, low farmer incomes, supply chain inefficiencies, multiple intermediaries, poor quality. Overcoming these problems will benefit farmers, state governments, forwarders and food processing units, farmers' price shares in the form of reduced losses and wear and tear, and provide employment opportunities for local people, etc. There are many factors that are acting as obstacles to the efficient supply chain of agricultural production in India. Sorted problems are further divided into different variables and factors that are deployed in their observations.

Cold Storages/Chain

India's cold chain has a variety of problems, including lack of cold chain facilities, lack of cold chain capacity and lack of cold chain network. This concern has made it difficult for agricultural producers to get the right rewards for their produce. Concern factors affecting the supply chain of agricultural production in every corner of India.

Fragmentation

One of the main problems in the supply chain of agricultural production in India is an infinite number of local traders and intermediaries who eat every share of the income of farmers. The entire supply chain in India is dominated by local traders. The overall process of advancing agricultural production is not very organized.

Integration

Linkage and integration between the multi-level players in the supply chain plays a very important role to make the whole

supply chain effective and profitable. But in the supply chain of Agricultural output in India there is a lack of forward and backward integration between the farmers and the other partners.

Infrastructure

Supply chain infrastructure plays an important role in agricultural production. The right and right infrastructure will help farmers deliver their goods in the right condition and at the right time. In India, leading to a high amount of loss infrastructure of the main obstacles in the supply chain of agricultural products.

Packaging & Storing

Packaging is very important for agricultural production because it is mostly fresh food and requires proper packaging for the handling of these fresh produce. Without proper packaging and storage, it is very difficult to maintain the shelf life. Cost is a very important factor for this problem. The high cost of packaging material makes things difficult for farmers

Technological

This technology is surrounded by many technical problems: problems of progress, inefficient technology, outdated technology, old machines. These concerns have made it difficult for farmers to reduce post-harvest losses and time for operational activities using appropriate minimal techniques and techniques

Farmer's Awareness and Preparation

Indian farmers have very poor knowledge about the use of modern agriculture to operate effectively and efficiently. They have very poor knowledge of the management of post-harvest produce, the quality of seeds, etc. Without the proper level of knowledge and awareness of farmers, the supply chain of agricultural

production will not be efficient, because farmers are the main source of this chain.

Quality

Quality has a strong impact on the supply chain, leading to efficiency and reduced customer rejection. Also, quality is a very important factor in the food industry, because it is directly related to people's health. For the supply chain, it is very important to provide fresh goods to customers in a timely and appropriate quality. Proper supply chains can help maintain the shelf life of agricultural products and prevent deterioration in quality. In India, there is a shortage of quality standards to meet international quality for export.

Processing and Value addition

Processing and added value are ways to extend the shelf life of the output produced and reduce losses. High amounts of processing may lead to low wastage of agricultural output. It gives a huge opportunity to export processed foods to various destinations. But in India, processing and added value are very low compared to other countries.

Financial

The income of farmers is very low in the state. They do not have adequate income for agricultural products, and the largest share is eaten by intermediaries. The difference between the final consumer price and the realization of farmers is very high (farmers get only 25% of the total consumer price share), and very high in the state. There is a lack of transparency in pricing in all Mandis of India because farmers do not get the right prices for fresh produce with their efforts

Transportation

Transportation plays an important role in the supply chain. Without proper transportation, goods cannot be delivered to customers at the right time and with the right quality. It plays a more important role in perishable foods because of its shorter shelf life, high perishable, required controlled temperatures. Transport-related challenges are very high in India due to the unavailability of well transport modes, high transport costs, lack of temperature-controlled vehicles for the movement of goods, etc.

Market Demand and Information

Proper information is the foundation of an efficient supply chain. Without proper information about market demand, the supply chain cannot run normally. In India, farmers lack information on prices, such as market, demand and food processing units. Bad information leads to poor perception of price, high amount of loss, delayed delivery of goods in the market etc. The National Agricultural Market (NAM) is a network Pan-Indian electronic trading portal to create a unified domestic market for agricultural products. The NAM portal provides a single window service for all relevant information and services. Aggregators like ENAM (the ITC initiative, which brings together large buyers, including farmers and manufacturers and e-Choupal, and links directly with rural farmers for the procurement of raw materials) are helping farmers get better prices as well.

Measures for improving supply chain and its effectiveness

Structural change is needed at different levels, from farmers to intermediaries to end users. Governments, businesses, cooperatives, technology providers and even the media can play an important role. Infrastructure such as roads, transportation, information and communications technology and

refrigeration are fundamental requirements for better results in the supply chain.

1. Demand forecasting is one of the important requirements to improve the effectiveness of SC. There is an imbalance between supply and demand due to poor forecasting of information.
2. The relevant departments serve as facilitators for the creation of infrastructure facilities for the marketing of fruits and vegetables in the United States. The Department of Agricultural Marketing promotes the marketing of agricultural/horticultural production in the United States.
3. Vertical coordination of farmers through cooperatives, contract agriculture and retail chains will promote better delivery of products, reduce market risk, provide better infrastructure, attract more public interest, acquire better dissemination services, and raise awareness about the adoption of new technologies.
4. Customized logistics is another important immediate requirement to make logistic efficient. This reduces costs, promotes the maintenance of produce quality and fulfills the requirements of targeted customers.
5. The government should introduce a subsidy system for the construction/modernization of refrigeration units. Cold storage is classified as an agricultural food processing industry for providing incentives and concessions available to the agricultural food industry.
6. Information systems for better coordination between different stakeholders, from farmers to consumers, are a need of time. The Internet and mobile communications can also be used to enable the transfer of information and finance between stakeholders.

7. Ppp (Public private partnership) is another strategic solution. Supply chain processes such as washing, grading, sorting, packing, pre-cooling, processing facilities, insurance, finance, transport and processing facilities add value to the functioning of the supply chain.

Recent issues

As in other states in India, several organizations in Assam have also begun a transformation of the supply chain for certain goods. However, the implementation of the same is not yet recognized on a large scale. The current surge in the COVID-19 pandemic has witnessed many incidents with farmers whose agricultural products were easily wasted with hundreds of quintiles due to lack of access to the right markets. But if the state had the right supply chain network, the situation could have been better. To address the challenges posed by the COVID-19 pandemic, India's agricultural sector will need a more modern and professionally managed agritech set-up that can address the challenges posed by the pandemic. However, there were no significant instances of agricultural supply chain disruption from anywhere in the country

Conclusion

In India, each state has its own culture, language, preferences, proper geographical location and, most importantly, the core competence of agricultural production. The agricultural sector maximizes its potential by applying the principals of supply chain management by enhancing collaboration among various stakeholders, non-exploitative vertical and horizontal integration, market reform, precision agriculture, contract agriculture, demand-driven diversification, and extensive and intensive use of information technology for real-time communication across the

chain. It can be realized. The development of an agricultural-only information system model for the continuous flow of information between different stakeholders in the chain is very necessary. The basic idea behind the supply chain is to manage information, not inventory. In addition, the pandemic COVID-19 or SARS-CoV-2 scenario elicits the real importance of having an efficient and robust supply chain in the country. Comprehensive innovation that combines significant improvements in products and processes and business and service models is easily essential to turning rural India into a profitable confluence of business activities.

Limitations and Future directions for research

The paper is based on data collected from published secondary sources. The findings are based on selected literature and a limited range of available data. This study is based only on descriptive research. However, there is sufficient scope for further research by establishing specific supply chain models and structures. There may also be a sample research study that takes into account the different stakeholders in the chain to understand the problem and possible solutions. This paper is only an assessment of the logistics of post-harvest agricultural production and the current state of the supply chain. The identified factors may be further tested and validated in the agricultural supply chain for other/specific goods. Similar empirical studies can be conducted for the supply chains of various relevant sectors, such as food processing units, the beverage industry and the cold chain industry, as well as for region-specific supply chains, including specific food or related agricultural products. Further research based on this paper could provide a direction to streamline the logistics and supply chain of agricultural production.

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