

# Conceptual Study of Problems And Challenges Associated With The Food Supply Chain in Developing Countries

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## Abstract

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**Purpose:** The food supply chain (FSC) is a sequence of linkages and interdependencies that encompass a wide range of disciplines, from farms to food to consumer's plates. Food supply chain management (FSCM) unites the major disciplines, aimed at providing an understanding of the supply chain (SC), supporting managers of the chain components, and improving the development activities of research in the SC.

**Method:** Narrative review was conducted using available literature on Google Scholar and Scopus database.

**Results:** In developing countries, many factors act as barriers to maintaining effective FSC. The potential reasons include the absence of infrastructure for cold chains and the lack of modern processing facilities that result in the highest inadequacies and losses of food and its allied products. Moreover, the whole FSC is loaded with various problems including quality and safety of products, poor SC connection, and cost-related issues. The important hindrance is "mandi systems (local word of wholesale markets)" that are entirely obsolete and ineffective in reducing food losses. Other issues include traceability problems, fair trading, technological issues, financial issues, processing, and value addition.

**Conclusion:** Blending new and innovative models of FSC with mandi systems can decrease food waste and losses and further improve the income of producers and processors.

**Keywords:** Food supply chain, management, developing countries, traceability, food waste.

## Introduction

SC is a network of individualistic organizations. These organizations linked together through different services and products. They add value to end consumers independently and together. Its broad idea is to add value to products and services and to its customers (Lu, 2011). Even though, there is no reasonable consensus regarding the concept of SC and Supply Chain Management (SCM). The supply chain is designed to be a set of interrelated participating firms, they add values from their origin to end products and services. These services and products are demands by the designed end customers (Copacino, 2019).

There are number of significant features used in the representation of a SC. First and foremost, SC can only be established and created if more than one



companies are involved. Secondly, within the SC, companies that are involved do not have the same company's business ownership. Although there is a lawful independence between them. Furthermore, they are linked to the common agreement to provide added values for the stream of flow of material via the SC. Every company receives this material flow, as converted inputs and as added value outputs (Hugos, 2018). One can logically visualize a SC as somehow as a "chain" which involved companies that are linked in adding values process. The upstream part is the supplier and the downstream part is linked with customer (Lu, 2011).

Although SCM is already defined in many ways through different point of views. The general and argumentable SCM definition is information, financial and physical flow management at every stage in the SC. In this way all members of the SC can achieve customer profits and values. From last decades, researchers are examining the wider topic of SCM from different angles (Lemma et al., 2014). Management of SC may be interpreted by the products and services flow. SCM begins with the product's source of origin and ends with consumption of the products. This also includes the storage and transfer of the raw materials used in operation and as well as inventory and completely developed products (Lu, 2011).

The primary goal of management of SC is to supervise, link services and products production, shipment, and distribution. Companies that manage the manufacture, internal products and supplies, distribution and sales can achieve this. The management of SC plays a major role in this era of globalization where competing companies supply customers with the highest quality products and meet their requirements (Jie et al., 2013). The efficient and effective SC strategy is usually depending on all companies. The major advantages of the effective SCM includes development of better relationships with customers and better services to customers. It builds good mechanism of delivery with minimum delay for demanded products and services (Ploenhad et al., 2019). It can improve the productivity and company functions, reduces costs for transport and warehouse, further reduces indirect and direct costs, moreover, supports the delivery of the right product at the appropriate place in time. It also improves the management of inventory and supports the successful completion of inventory models in time, supports businesses to adapt to the global challenges, economic upheavals, growing consumer demands, and associated differences, help businesses to reduce waste, reduce costs and achieve efficiencies across the SC (Lu, 2011; tutorialspoint, 2016).

Every business aims to match demand supply with the most effective utilization of resources at the right time. Some of the key SCM goals are as follows: SC members work together at various levels to enhance the productivity of the resource, establish standard procedures, eliminate duplication of effort and lessen stock level (Poirier, 1999). Trying to reduce SC costs is important, particularly when businesses are in uncertainties regarding one's wish to retain capital. Efficient cost and affordable products are required, besides SC professionals need to focus on creating value for customers. The best way for the satisfaction of customer is periodically exceed customer expectations. Enhance customer expectations for higher product range, custom designed products, stock availability during off season and quick fulfillment should be linked at an expense comparable to store offerings. Handler needs to use sharing inventories and distributed command management techniques for order completion in order to meet consumer expectation from the best possible junction in the SC (tutorialspoint, 2016).

## **Material and Methods**

### **Research statement**

Food supply chain management is one of the critical issues in decreasing value addition and innovations in nutritional management in developing countries. The main research question was to evaluate the current challenges and issues in food supply chain management in developing countries.

### **Research Methodology**

Comprehensive literature search was conducted on different search engines like Google Scholar, Web of Science and Scopus to evaluate articles on “food supply chain management” and “developing countries” and “challenges” and “treats”. 80 different articles were selected and later reviewed for drafting this article.

### **Research Importance and objectives**

Managing food supply chain is critical for ensuring food security in developing countries. This review provides critical insights on all factors that are important in ensuring tight and practical approaches toward management of food supply chains in developing countries.

## **Food supply chain**

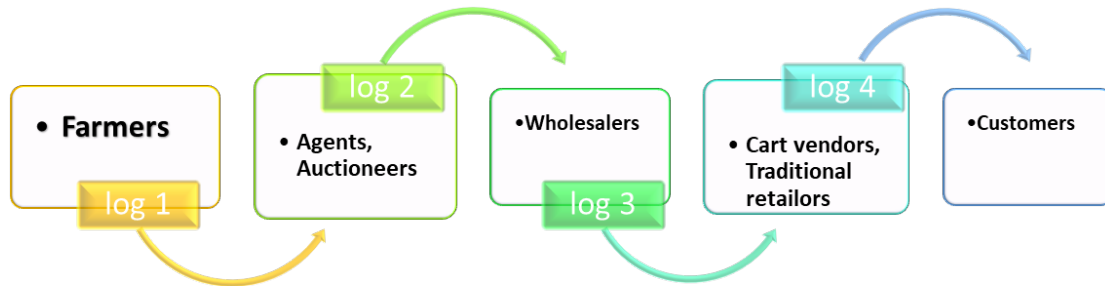
The Food supply chain (FSC) is a sequence of linkages (Fig. 1) and interdependencies that encompass a wide range of disciplines, from farms to consumer's plate (Bourlakis and Weightman, 2004). Food Supply Chain Management (FSCM) unites the various disciplines, with the goal of providing an understanding of the SC, assisting managers of the chain components, and improving the development of activities of research in the SCM. The management of FSC has a “Farm to Fork” framework (Lu, 2011). Two types of FSM normally exist, first one is value chain, second is demand chain. The logical explanation of both is explained below:

### **Value chain**

When companies involve in value addition activities. It includes process or set of activities where companies add values to food article, such as after service production, marketing, and supply of the services. There are five primary activities involve in value chain including inbound logistic, operation, outbound logistic, marketing strategy, sale and services (Gómez and Ricketts, 2013).

### **Demand chain**

It is when, different services and processes connected to fulfill customer demand (Agrawal, 2012). The demand chain has been the component of the value chain that drives demands (Oeser et al., 2018). There are two distribution chain and supply chain includes in short supply chain and long supply chain (Nkwabi, 2019). Short supply chain includes few intermediaries, usually more cost, have greater control over marketing of products. It is more time consuming for the producers (Migliore et al., 2015). Long supply chain involves more intermediaries than short supply chain. It reduces the cost as well (Jain and Benyoucef, 2008).

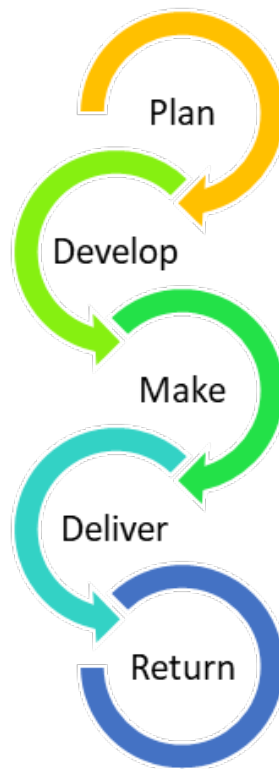


**Figure 1.** Traditional components FSC. These interrelated logs need to be well defined and managed for successful conversion of raw materials into finished products and further to meet the consumer demands and expectation.

## Food supply chain management process

FSCM is a process, in which companies make sure an efficient and economical SC. Any action taken by a company to convert raw material into a product in a systematic way is termed as FSCM. The five basic elements (Fig. 2) of the FSCM process includes:

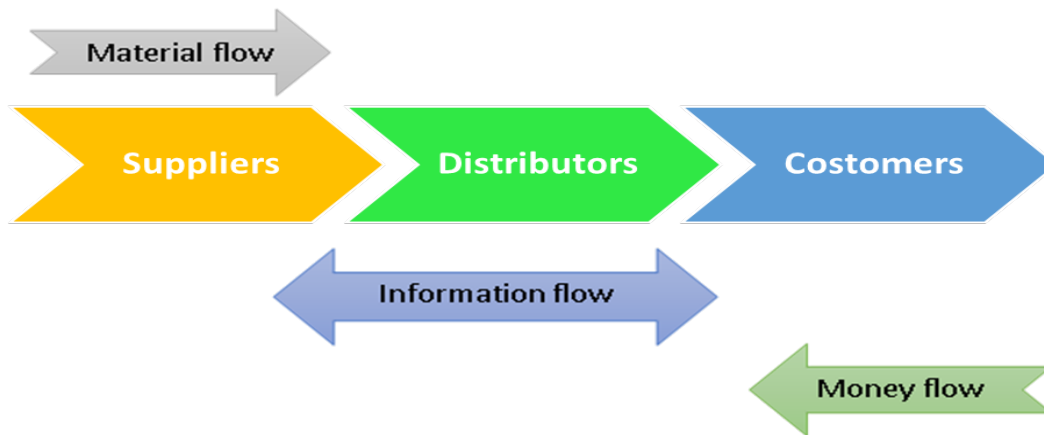
1. *Plan:* At this stage of SC, the products and services are planned to meet the demands of customers. Here companies need to develop a plan or a strategy and need to design a strategy that produces maximum profit.
2. *Develop:* Companies concentrate mainly on developing a strong relation to the raw material supplies necessary for manufacturing. Companies also establish different methods of planning for delivery, shipping, and product payment. Finally, all these processes for managing their inventory of goods and services are combined by the SC managers.
3. *Make:* The manufacture or production of products demanded by the consumer is manage at this stage. The products or services are designed, manufactured for delivery, verified, packaged, and synchronized. The SC manager's task is to plan all the required activities in the production, verifying, packaging and delivery preparation process. Make stage is expected to be the leading metric unit in SC in which companies measure the quality, production, and productivity of employees.
4. *Deliver:* At this level the products are supplied by the supplier to the customer at the destination. This stage is essentially the logistical stage. Here customer orders are approved, and products are delivered. Companies collaborate on order reception, create a system of warehouse, select carriers to supply customers with products and create a payment invoicing system.
5. *Return:* At final stage of the process, the customer shall return to the supplier for damaged and defective products. After this, companies have to address and response to customer complaints (Lu, 2011; tutorialspoint, 2016).



**Figure 2.** The components of supply chain management process. The process is extremely interrelated that starts from planning till handling consumer complaints. In a simple terminology it may be called as lock and key model of SC. If one segment or step is locked, then overview SC is affected with numerous complaints in food safety management and others.

### Supply chain management flow

The SCM consists of three distinct kinds of flow (Fig. 3). First one is information flow. Quotation requests, purchase order, periodic timetables, demands for engineering changes, quality issues and supplier performance reports are all part of this flow. But from the side of producer to the customer, this flow includes a company presentation, an offer, purchase order verification, a report on deviation actions, shipment details, inventory reporting and receipts (Li, 2013). Second one is money flow, and this flow is relevant for producer from the customers. This flows to the client from producer as a result of debit notes (Gupta and Dutta, 2011). Next is the material flow, and a smooth flow of product to the consumer from the producer is included. Different warehouses between distribution companies, wholesalers and retailers allow this part of supply chain management flow (Prajogo and Olhager, 2012). In brief, it is important to manage all flows efficiently with little attempt to attain an effective supply chain.



**Figure 3.** The supply chain management flow with relation to material, money, and information.

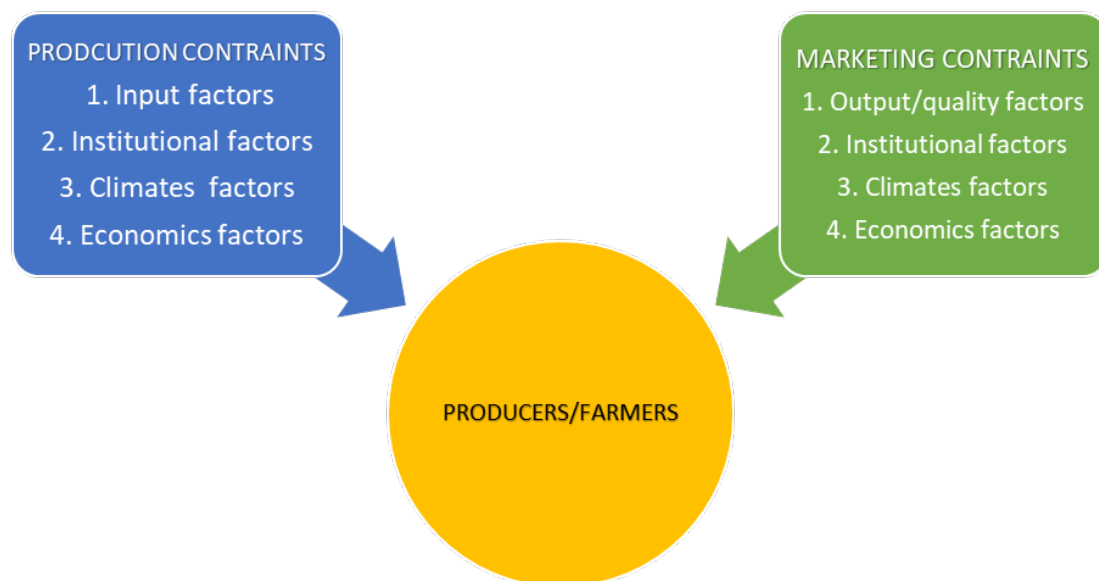
### Factors influencing supply chain

Agriculture FSC plays a key role in ensuring farmers have access to the market. This has the impact on rural farmers' social, environment and economical sustainability (Naik and Suresh, 2018). To encourage sustainable and effective food systems, improve market access and integrate small holders more effectively into SC. Farmers, governments, agricultural businesses, and civil society have the responsibility to collaborate with them. More than 70% of the world needs of food come from small-scale manufacturers. The agriculture sector is a major origin of global jobs and revenue. Hundreds of thousands of poor families of developing counties can get benefits from ensuring the sustainability of the FSC (Kumar et al., 2017).

In majority of the countries, agriculture contributes significantly to the overall likelihood of the human and raw materials. Food items are minimum discovered in SCM between agriculture commodities. In recent decades, many literatures have been produced on management of SC in both the production and services sectors. However, the agricultural sector has not received much attention. Developing countries mainly focused on farming and farming accounts for around 40% of the labor force and about 60% of the livelihood of the rural farmers. While agriculture is the pillar of rural farmers. Poverty is common due to lack attention on agriculture SCM (Ashfaq et al., 2019).

Seuring and Müller defines the sustainable supply chain management (SSCM) as “the management of material, information and capital flows as well as cooperation among companies along the SC while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements” (Galal and Moneim, 2016). Sustainable SCM in agriculture food is therefore very essential to promote profitability now. The performance of agriculture, even though, remains slower. Innovation in technology is not rapid, limited use of gradual farming technology, issues with input quality, volume and time, low construction investment and maintenance of infrastructure, restriction on the marketing and trade, pesticide and livestock diseases and low amount for agricultural loans are the major factors that contribute to this performance (Ashfaq et al., 2019). Fig. 4 points an integrated framework of factors that influences SC, these factors either include production constraints like climate and environment issues, and these further linked with marketing constrains. New quality management tools like GlobalGAP and other Global Food Safety Initiative tools help farmers to compete in markets especially through Global Market Development Programs.





**Figure 4:** Factors influencing supply chain management. Both production constrains and marketing constrains are interlinking with each. The simplest understanding is to blend these factors with total quality management concept for improving food supply chain management.

## Problems and challenges associated with SC in developing countries

In developing countries, there are many factors that act as barrier for effective food supply chain. The below mention issues observed are still chronic in various countries and summary of these issues is presented in Table 1. Several of these factors must be assessed in term of demographic characteristics and market in different countries, from which mitigation solutions can be devised. Following are the issues related to supply chain in developing countries:

### **1. Inability to maintain safety and quality of products**

Safety and quality are the significant elements in the food sector because these are directly associated with the people's health and has an influence on supply chain. In food supply chain, it is important to maintain quality of any product and satisfy the customers demand by delivering the product at the right time (Lam et al., 2013). A proper SC helps to ensure the products sustainability and prevent the quality deterioration. On the other side, adulteration and illegal additives in food products increasing the safety problems that has effect on SC in industry. As a result, there is more effectiveness and more chance of customer rejection (Veena et al., 2011). Safety and quality issues arise in developing countries due to the lack of quality, productivity and hygeine standards that are acceptable in interntaional market. As well as these issues are also increased due to lack of safety controls like manual handling, absence of traceability, tracking facilities and quality degradation around the supply chain (Tian, 2017).

There are several strategies to get the better control over safety and quality issues. These strategies include the regulations of food safety standards, use of innovative technologies for presevation, use of suitable storage conditions, use of digital methods for traceability, use of low cost and approved quality pacakging materials across the SC (Dabbene et al., 2014).

## **2. Inadequate communication between the parties**

In order to produce SC efficient and profitable, the link and incorporation among different participants in the SC is crucial but unfortunately, issues arise due to weak communication gap from producer to consumer. There is an inefficient link among government, industries and institutions (Crum et al., 2011). There is less interconnectivity in the channel of marketing from gate of farm to the mandi that has impact on the SC. As well as lack of processing units, there is a gap among processing unit operators and the farmers (Bezuidenhout et al., 2012).

To overcome the communication gap, there are strategies that could be used. These strategies include the non-government organizations and private firms. Non-government organizations can interlink the food companies and farmers to provide them a platform and contract farming can be option for private food firms.

## **3. Fragmentation issues**

The major problem in developing countries is the large number of intermediaries and local traders. These local traders control the food supply chain, much the farmers share, and food supply chain parties rely heavily on the intermediaries. A huge number of commission and local agents are present. This has an impact on SC (Halder and Pati, 2011). Personal relationships, trust, reliability, communication, and stability are the key features of consideration. The absence of these features leads to splitting and over control desire. Mutual trust and cooperation are important system support (Narula, 2011).

To resolve these issues, government should have to play a vital role by creating cooperative marketing societies for the farmer. Government agencies can play a role of village aggregator at the level of producer and farmers and can take part in activity of value addition.

## **4. Poor physical infrastructure**

In developing countries, supply chain infrastructures play a key role in food supply chain. Suitable and sufficient infrastructure enables farmers and agricultural entrepreneurs to successfully manage their business. It also helps to deliver the products in suitable conditions. Infrastructure is a major obstacle to agriculture's supply chain resulting in high losses (Veena et al., 2011). These infrastructure losses includes the insufficient storage, poor warehouses conditions, inadequate mandi and farms loading and unloading, unavailability of processing and packaging resources (Balraj, 2016). On the other side, there is a need of transport near farms, but poor roads and less transport facilities towards backward areas affecting the farmers food supply chain (Narula, 2011).

To overcome the issues of infrastructure, there are some mitigation strategies. Government and agencies can establish the semi processing units near the agriculture produce. They can provide better grading facilities and equipments for farming throughout the district areas.

## **5. Poor knowledge and awareness of farmer**

Farmers don't have much competency and knowledge about the FSC in many developing countries. Even they don't have the enough knowledge regarding new technologies, post-harvest management, food and food products quality, investment in farming, consumer's demands, biodiversity loss and climate change. The time is based on new technologies such as internet based smart FSC. The FSC cannot be effective without the farmer's adequate level of awareness and knowledge (Negi and Anand, 2015b).



At district level government and agencies can organize the technical fairs and exhibitions, through which farmers can get information of new developing techniques. Government can collaborate with the research institutes to help with the farmers how they can increase their production sustainability.

### **6. Cold storage issues**

Some products are so delicate that they need proper storage conditions to prevent from any microbial contaminations. There have been several issues reported with storage condition in emerging countries. They don't have the sufficient capacities, cold storage resources and lack of cold storage network. These issues effecting the farmers products and they are having difficulties to get their results properly, resulting into not getting even their estimated basic profit (Balaji and Arshinder, 2016). it's difficult to manage foods that have shorter shelf life without any specific storage condition. Food supply chain is more complicated and become harder to maintain the food products (Negi and Anand, 2015a). So, it is important to develop techniques to maintain the shelf life and quality of food products, which will maintain the food chain supply. Despite the fact, food temperature and time sensitive in nature (Aung and Chang, 2014a).

To mitigate this issue, government and private agencies should provide assistance through providing cold chain storage houses near the production belt. They must be properly taken care of, throughout the supply chain process. From harvesting to packaging, there should be proper check and balance that ensure the quality of food products (Sharma and Singh, 2011).

### **7. Raising supply chain cost**

For proper packaging of food produced, there are numerous costs associated with managing the FSC. Packaging and handling of products required sustainable SC and to reduce the food loss. After packaging, it is important to deliver those products in time with proper allocation (Isakson, 2014). It is difficult to maintain the shelf life of food products without packaging because it will enhance the deterioration and quality will be decreased. The packaging cost matters mostly for the industrial SC. As rise in packaging cost will make it harder to supply the more food products properly. Transportation cost, treatment costs and coal prices, all climb making the SC more difficult to manage (Pan et al., 2012).

To overcome this issue, industries can collaborate with packaging material providers, warehouse owner's and transportation companies. The cost can also be reduced by value cost calculation. Multiple food supply chain solutions can be facilitated with a single implementation. Search for integrated solutions of the SC that allows everyone to communicate with all the collaborators.

### **8. Technology based issues**

The technology is circled by numerous technical problems. It includes developments, ineffective techniques, use of old machinery and outdated techniques. As a result, farmers and agricultural businessmen are having difficulties using suitable technology and increasing their losses and take more time on harvesting operations (Rathore et al., 2010). The elements that play a key role are the lack of use and improper technologies in food processing, as well as the adaptation of effective technologies, cost effective processing and packaging machinery (Aamer et al., 2021).

At district level government and agencies can organize the technical fairs and exhibitions.

Through these fairs they can address to new developed techniques. Government can collaborate with research institutes to provide information about new technologies to farmers. Government can also develop the rural entrepreneurs in engineering, technology and science of food (Satterthwaite et al., 2010).

### **9. Traceability issues**

In term of dealing with food crises and incidents, the food industries are becoming customer oriented, and needs quicker responses. Strong traceability network systems reduce the processing and delivery of unhygienic and low-quality goods. Thus, reduce the potential for advertisement, recalls and liability are the important to maintain product SC (Aung and Chang, 2014b). Better documentation helps to defend producers from adulteration of products and hazardous food risks. The above mention types of contamination currently constitute a major issue in developing countries (Bosona and Gebresenbet, 2013). Due to this, country need to emphasis to apply traceability systems. These events catch the attention of consumers to food integrate and safety, that increase consumer awareness to implementation of traceability system (Haleem et al., 2019).

Companies need training in human resources, managerial support and IT infrastructure to implement a traceability system. They need innovative and recent technologies for the implementation. Food companies can use new technologies such as block chain technology. It is a digital way for users to reserve or share data around the network.

### **10. Food loss and waste issue**

To manage and mitigate food waste, the major food cause must be identified and characterized throughout the FSC. The causes of food loss and waste issues are mainly associated with financial and technical limitations as well as due to mishandling of food produce, unavailability of temperature, microbial contamination, over and low production demand (Raak et al., 2017; Wohlgemuth et al., 2021). Based on the cultural and economic growth, food waste varies at every step of SC because losses of food mainly occur at harvesting, sorting, grading and on retailing demands (Rezaei and Liu, 2017).

Strategies must be developing to overcome the food waste. To overcome this problem, improve techniques of harvesting, farmer's education, cleaning, and storage conditions must be maintain in the SC. The responsibility of the government to build agricultural capacity and support such policies those are profitable for the farmers. Private sector can create a supportive environment for the investment in private sectors.

### **11. Value addition and processing problem**

Increasing the shelf life of food products or minimizing losses has been accomplished through the processing or adding value. Food waste levels may be reduced as a result increased of food manufacture. It provides a significant opportunity to export the food products to different areas (Singh and Shabani, 2017) However, food processing is quite low in developing countries in comparison with developed countries, so the value adding is quite low. There is scarcity of infrastructure and poor connectivity to processing facilities (Parwez, 2013). It is a responsibility of government to establish such processing units that are near to the production area. So, this issue can be resolved immediately.

### **12. Financial problems**

Farmers' incomes are extremely low across the countries. Their earnings for agricultural products are not adequate. The majority of their shares are consumed by the intermediaries (Zhao et al., 2021). In the country, there is huge difference between final price farmers

and for the consumers. Farmers receive only 25% of the total cost of user share (Turi et al., 2014). These countries lack transparency in their markets. That's why farmers don't get their fair values of the produces (Sharma and Singh, 2011). By removing all the intermediaries, government can boost food retailing and ensure that farmers receive their return. It is possible to establish agricultural cooperative markets. Government can develop retailing of food; ensure that farmers receive fair gains through removing all intermediaries. Agricultural cooperative markets can be established. Government and NGOs can assist by providing funding and loans for better growth.

### ***13. Transport problem***

Transport takes a significant part in the supply chain. In the lack of proper transportation, things cannot be delivered to the consumers on time and in good condition (Narula, 2011). It has a greater role in perishable foods due to low shelf life. Proper temperature is required for perishable foods (Zhang et al., 2017). The challenges regarding transport are really considerable in developing countries because transportation costs are expensive, no proper way of delivering the product and unavailability of temperature regulated transit for perishable food (Gharehgozli et al., 2017). It is the responsibility of state government to provide low-cost transportation, which has all the feasible conditions. In the remote areas, private enterprises might build up a refrigerated van chain together the fresh produce. Government can take initiative to make the roads good and proper for transport.

### ***14. Information and demand of market problem***

The effective FSC is based on right and adequate knowledge. In the absence of market demand information, FSC cannot function effectively. Producers in developing country lacks sufficient information about market prices, market demands and working food processing units (Ha et al., 2011). Inadequate details may lead to reduce price realization and huge losses, which cause market distribution of products to be delayed (Shukla and Jharkharia, 2013). Government can help in this problem by creating E-portal which will provide the information of all food products available in the market and will provide the documentation about right demand of the market on demand forecasting. Agencies can set up the E-portal in every state according to state's market demand.

### ***15. Fair trading issue***

Fair trading plays an important role in economy of any country. In emerging countries, food fraud is now common. In the whole food processing, from farm to fork, adulteration is done either intentionally or unintentionally (Asche et al., 2015). The purpose of this is in getting more gain and to harm the reputation of the company. In this problem, anyone can cause harm to reputation of the company either inside or outside of the company by instilling employee trust, implementing traceability system, providing information concerning food fraud at the time of head and continuing the effectiveness mitigation techniques (Simangunsong et al., 2016).

**Table 1.** Problems and their reasons in developing countries food supply chain and their mitigation strategies

No.	Problem	Reasons	Mitigation strategies
1.	<b>Inability to maintain safety and quality</b>	<ul style="list-style-type: none"> <li>-Lack of quality and productivity standards</li> <li>-Poor safety and hygiene standards</li> <li>-Manual handling</li> <li>-Absence of traceability</li> </ul>	<ul style="list-style-type: none"> <li>-Strengthen regulation</li> <li>-Use of advance technologies for preservation and chilling</li> <li>-Digital technologies for tracking</li> </ul>
2.	<b>Inadequate communication between the parties</b>	<ul style="list-style-type: none"> <li>-Forward-backward weak incorporation</li> <li>-Insufficient link between government, industries, institutes</li> <li>-Weak link of market facilities</li> <li>-Unavailability of processing unit for small size farmers</li> </ul>	<ul style="list-style-type: none"> <li>-Private food firms undertake contract farming</li> <li>-NGOs can be intermediary among food companies and farmers</li> <li>-Learn how to collaborate</li> </ul>
3.	<b>Fragmentation issues</b>	<ul style="list-style-type: none"> <li>-Local traders munch all farmer's share</li> <li>-Heavily rely on intermediaries</li> <li>-Lack of mutual trust, reliability, stability, and communication</li> </ul>	<ul style="list-style-type: none"> <li>-Government can create cooperative marketing societies</li> <li>-Agencies can be play a role of aggregator (producer and farmer level)</li> <li>-Government can take part in value addition</li> </ul>
4.	<b>Poor physical infrastructure</b>	<ul style="list-style-type: none"> <li>-Insufficient storage and warehouses conditions</li> <li>-unavailability of packaging and processing resources</li> <li>-Unavailability of transportation</li> <li>-Poor marketing infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>-Government can establish semi processing units near produce</li> <li>-Government can also provide better equipment for loading or unloading</li> <li>- Food parks can be established (packaging, grading facilities)</li> </ul>
5.	<b>Poor knowledge and awareness of farmer</b>	<ul style="list-style-type: none"> <li>-Insufficient knowledge of new technologies, post harvesting management and food quality</li> <li>-With inadequate knowledge cannot work effectively</li> </ul>	<ul style="list-style-type: none"> <li>-At district level technical fairs can be established</li> <li>-Government can collaborate with research institutes to give farmer information about new technologies</li> </ul>
6.	<b>Cold storage issues</b>	<ul style="list-style-type: none"> <li>-Insufficient capacity</li> <li>-Shortage of cold storage resources</li> <li>-Unavailability of cold storage network</li> </ul>	<ul style="list-style-type: none"> <li>-Government can build cold storage houses (near production belt)</li> <li>-other NGOs can be play a role in establishing houses</li> </ul>
7.	<b>Raising supply chain cost</b>	<ul style="list-style-type: none"> <li>-Packaging, manpower, logistics cost</li> <li>-Transport, fuel cost</li> <li>-Less investment in new technologies</li> </ul>	<ul style="list-style-type: none"> <li>-Industries can collaborate with packaging industries, transport, and warehouses owner</li> <li>-Cost can be reduce by value calculation</li> <li>-Search for integrated solution (allow everyone to communicate with all collaborators)</li> </ul>
8.	<b>Technology based issues</b>	<ul style="list-style-type: none"> <li>-Ineffective technologies and techniques</li> <li>-Old machinery, outdated techniques</li> </ul>	<ul style="list-style-type: none"> <li>At district level technical fairs can be establish</li> <li>- Government can develop the rural entrepreneurs in engineering, technology, and science of food</li> </ul>

<b>9. Traceability issues</b>	<ul style="list-style-type: none"> <li>-Less and unclear documentation</li> <li>-lack of communication and collaboration</li> <li>-Variation in products</li> <li>-Complex supply chain</li> </ul>	<ul style="list-style-type: none"> <li>-Need support for management and infrastructure of IT</li> <li>-Companies need training regarding human resources</li> </ul>
<b>10. Food waste and loss issues</b>	<ul style="list-style-type: none"> <li>-Mishandling and manual handling</li> <li>-Unavailability of suitable conditions</li> <li>-Long stay at warehouses</li> <li>-Over production and low demand</li> </ul>	<ul style="list-style-type: none"> <li>-Built agricultural capacity</li> <li>-Government can fund for storage area building</li> <li>-Help in accessing markets</li> </ul>
<b>11. Value addition and processing issues</b>	<ul style="list-style-type: none"> <li>-Insufficient units of processing</li> <li>-lack of infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>-Government can establish semi processing units</li> </ul>
<b>12. Financial problem</b>	<ul style="list-style-type: none"> <li>-Communication gaps among farmers and institutes</li> <li>-Lack of transparency</li> <li>-High ups and down in fresh produces</li> </ul>	<ul style="list-style-type: none"> <li>-Government can establish retailing of food</li> <li>-Ensure small farmers receive fair share</li> <li>-Establishment of agricultural cooperative markets</li> </ul>
<b>13. Transport issues</b>	<ul style="list-style-type: none"> <li>-High cost</li> <li>-Unavailability of temperature-controlled transportation system</li> <li>-Conditions of road</li> </ul>	<ul style="list-style-type: none"> <li>-Government can provide cold transport at cheap rate</li> <li>-Private companies can set up refrigerated van chain near rural areas</li> </ul>
<b>14. Information and demand of market issues</b>	<ul style="list-style-type: none"> <li>-Producers don not have inadequate information about market prices, demand, and units of processing</li> </ul>	<ul style="list-style-type: none"> <li>-Government can develop e portal system</li> <li>-documentation about demand and information</li> <li>-set up of e portal in every state</li> </ul>
<b>15. Fair trading issue</b>	<ul style="list-style-type: none"> <li>-Lack of international standard</li> <li>-Competition among brands (food fraud issues)</li> <li>-Communication gap</li> </ul>	<ul style="list-style-type: none"> <li>-Continue review of vulnerable points</li> <li>- Strengthen regulations</li> <li>-Gain employee confidence</li> <li>-Introduce traceability system</li> </ul>

## Conclusion

The reviews focused on poor supply chain and logistics in developing countries that shows inefficient food supply chain management. This is due to the absence of infrastructure in the cold chains and processing facilities that resulted in highest inadequacies and losses of food and waste. The whole food supply chain is loaded with various problems. This includes quality and safety of products, poor supply chain connection, cost of material, ineffective mandi system, poor infrastructure of roads, intermediary dependence, long and integrated chain, losses, and post-harvest waste. This further results in inadequate realization of price of the producers and purchase burden on customers. The greatest obstacle is the fast growth of developing countries that further makes agricultural production extremely ineffective together with incompetent supply chain and infrastructure of cold chains.

Agriculture sector is a high growth zone in developing countries that offers an enormous chance for the agribusiness and rural development. Even though, the food supply chain is affected by different factors. The above mentioned represent significant problems to the food industries area and influence the development of poor countries. It demands urgent response which can help in reducing potential problems. Proper models of supply chain need to be developed that can help to increase the shelf life of the products. These models can decrease the waste and losses in food supply chain, rise income of producers, create opportunities for employment for the local area people, enhance

farmers' lives and overall growth of developing countries.

### Conflict of Interest

The authors report no conflicts of interest.

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# دراسة مفاهيمية للمشاكل والتحديات المرتبطة بسلسلة التوريد الغذائي في البلدان النامية

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## المُستخلص

الخلفية: سلسلة الإمدادات الغذائية هي سلسلة من الروابط والاعتماد المتبادلة التي تشمل مجموعة واسعة من التخصصات، ابتداءً من المزارع وانتهاءً إلى الغذاء المقدم في أطباق المستهلك. توحد إدارة سلسلة الإمدادات الغذائية بعض التخصصات الرئيسية، بهدف توفير فهم لسلسلة التوريد، ودعم مديري سلاسل الإمدادات الغذائية، وتحسين أنشطة تطوير البحث في اللجنة العليا.

الطريقة: أجريت مراجعة السرد باستخدام الأدبيات المتاحة.

النتائج: في البلدان النامية، تكون هناك العديد من العوائق من أجل الحفاظ على فاعلية سلسلة الإمدادات الغذائية مثل عدم وجود بنية تحتية لسلاسل التبريد ونقص المرافق الحديثة لدى الوسطاء والتي تؤدي إلى أعلى حالات القصور والخسائر في جودة الأغذية والمنتجات المرتبطة بها. علاوة على ذلك، يتم تحميل سلسلة الإمدادات الغذائية بالكامل بالمشاكل الأخرى بما في ذلك جودة وسلامة المنتجات، وسوء اتصال سلسلة التوريد، والقضايا المتعلقة بالتكلفة. يبقى العائق المهم وهو أنظمة سوق الجملة أو ما يسمى بـ «سوق المندي» (المندي هي الكلمة المحلية لأسواق الجملة للأغذية باللغة الباكستانية) وهذه الأنظمة عفا عليها الزمن تمامًا وهي غير فعالة في الوقت الراهن في الحد من فقدان جودة الغذاء.

الاستنتاجات: وتشمل العوائق الأخرى مثل مشاكل التتبع، والتجارة العادلة، والقضايا التكنولوجية والمالية، وطريقة المعالجة، وإضافة القيمة. يمكن أن يؤدي مزج النماذج الجديدة والمبتكرة من سلسلة الإمدادات الغذائية مع أنظمة سوق الجملة إلى تقليل هدر الطعام وخسائره وزيادة تحسين دخل المنتجين والوسطاء والبائعين.

مفاتيح الكلمات: سلسلة إمداد الغذاء، الإدارة، البلدان النامية، إمكانية التتبع، نفايات الطعام.

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