

Reverse Logistics Inefficiencies: A Multiple Case Study Analysis of Food Supply Chains from Pakistan and Malaysia

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ABSTRACT

The purpose of this study is to examine the fundamental roadblocks of reverse logistics (RL) process in the food supply chains (FSC). This paper employs an exploratory approach with multiple case study perspective to examine RL inefficiencies within two contexts namely, Pakistan and Malaysia. Backed by an extensive review of recent literature of various types of challenges and hurdles of RL design and implementation, the study proposed a framework to mitigate all the risks and hurdles. Qualitative data was collected through semi-structured interviews followed by thematic analysis for the identification of RL inefficiencies in FSC. Findings demonstrated that although both countries have different reverse logistics designs, they face common issues in terms of managing complexity, communication, financials, and waste. The framework has practical implications in guiding the logistics and supply chain professionals for the effective design and development of RL strategy and best practices in food sector.

Keywords: food industry, food supply chain, malaysia, multiple case study, pakistan, reverse logistics, reverse logistics best practices, reverse logistics strategy

1. INTRODUCTION

Since the second half of the nineteenth century, the food structure has been firmly influenced by the marvel of globalization. Direct connections among farmers and customers have been supplanted by a perplexing arrangement of entertainers which incorporates a few mediators (Dunne *et al.*, 2010). Globalization has likewise prompted a breakdown in biodiversity and atmospheres, an expansion of resoluteness and food deprivation causes the difficulty for consumers to have sufficient data about food provenance and quality (Pulker *et al.*, 2018). Logistics is one of the principles feeble focuses for the advancement and the adequacy of FSC, subsequently, its improvement speaks to a test that can effectively add to changing FSC into a solid and reasonable option in contrast to the globalized food

framework (Janjevic *et al.*, 2017). Food frameworks are mind-boggling and continuously changing after some time (Wognum *et al.*, 2011). Currently, customers have an expanding interest in food quality, security, and sustenance, as opposed to simply amount.

The idea of reverse logistics (RL) has been generally studied in numerous ventures (e.g., assembling, electric and electronic, and pieces of clothing) picking up a genuine job in accomplishing the supportability objectives of endeavors for greening their supply chains. The idea of RL covers benefit and cost improvement as well as green standards and laws. The principal purposes of RL are principal to zero in on cycle activities that affect ecological conditions at each phase of the production network, for example, waste minimization and upgraded asset use (Mutingi, 2013). In this way, ecological concerns can straightforwardly influence the monetary execution of any association. Reverse logistics practices are important to guarantee high quality and sanitation because of quick destruction and short shelf life (Vlachos, 2014).

The number of online returns has risen dramatically as a result of buying. Returns on the internet are expensive, and they've presented businesses with several problems.

Reverse Logistics activities of food items are important to diminish food waste and guarantee the effective progression of logistics activities. Food waste and loss have numerous adverse consequences for the climate by expanding greenhouse gas emissions and contamination (Sathiyagothai and Saravanan, 2017). Reverse logistics, which involves the return movement of products and services in the supply chain, is becoming a crucial business activity regardless of industry or product, or services involved (Ramish *et al.*, 2022, Pujawan, 2016). As a result, because delivering a product to a client does not necessarily complete the business cycle, items are frequently returned to downstream trade partners or must be recovered. As customers demand more in terms of products and services, supply chains have become more complicated. Firms are using e-commerce, or online shopping, as one strategy to

meet these expectations (Adebayo, 2022). RL enables businesses to better manage garbage and improve their environmental efficiency. RL operations provide several benefits, including reduced use of raw material resources, the creation of economic value through waste recovery, improved customer satisfaction, energy savings, landfill reduction, and reduced gas emissions. Because of the complex and dynamic nature of RL, its actions have a beneficial influence on environmental concerns, generate green benefits, and should be evaluated holistically (Kazancoglu *et al.*, 2021).

The objective of this study is to give further theoretical and applied understandings to the reverse logistics (RL) inefficiencies in FSC utilized in two nations, specifically, Pakistan and Malaysia. This study evaluates the difficulties that FSC faces when disseminating food products within the supply chain focusing explicitly on obstacles due to reverse logistics. An exploratory, qualitative methodology is embraced and the accompanying research question is developed to center the research methodology:

RQ1: *What are the basic reverse logistics issues seen inside the domain of FSC, which impact the delivery of food?*

RQ2: *What would be the best framework to mitigate reverse logistics inefficiency in the food supply chain more effectively and efficiently?*

This study involved an interdisciplinary way to deal with the assurance of the accuracy and legitimacy of the proposal, analysis, and yields. While it has received a solitary focal point of examination [that is the activities of supply chain management (SCM), it has communicated with and included professionals from the two schools of FSC industries and schools of the executives. This interdisciplinary methodology is described as a dramatic commitment by (Paciarotti and Torregiani, 2021). Cheng *et al.* (2009) proposed that interdisciplinary exploration produces productive knowledge through coordinating and joining ideas in a hypothetical and coherent commitment.

In Section 2, significant writing is introduced contending that unpredictable frameworks, for example, the FSC, require well-established methodologies to be overseen viably. Section 3 diagrams the examination technique received to investigate the subject under study. In this way, the findings area (Section 4) subtleties the main driver issues that are related to the powerless exhibitions in the two nations, which is essential for enhancing the reverse logistics efficiencies of the FSC. This is followed by Section 5, which talks about the commitment of this consideration; further hypothetical and reasonable bits of knowledge are given to SC methodology advancement, particularly those that have been described as exceptionally intricate. At long last, conclusions and limitations of the research are, from that point, introduced in Section 6.

2. LITERATURE REVIEW

The food supply chain is characterized by Folkerts and Koehorst (1997), as "a bunch of associated organizations that work intently together to deal with the progression of products and inventiveness along with the value-added chain of farming and food items, to acknowledge predominant

customer esteem at the most minimal potential expenses". The fragmented structure of global food supply chains adds to the difficulty of meeting customer demands for food safety, quality, variety, and authenticity. The food supply chain is a constantly changing system that includes food chains, main producers, manufacturers, distributors legislators, third-party actors, and other resources that were brought in to help for an efficient food supply chain (Rejeb *et al.*, 2022). Reverse logistics is essential in the food business to give better quality and safe food to consumers with no harm to human beings and the climate (Vlachos, 2014). RL in the food business manages a scope of difficulties, for example, food returns, food reclaimed, recycled, and disposal (Vijayan *et al.*, 2014).

Meyer *et al.* (2017) defined inner boundaries are preventions that affect the management of reverse logistics internal interferences comprise cooperation, communication, commitment, inadequate information system, and financial aspects. There are a few reasons that require the utilization of RL in the food industry e.g., products' short life cycles given prospective damage and item expiry, return of low-quality items, and inability to match the standards. There are three significant regions in the food business where RL is fundamental: diminishing food waste, bundling, and material waste (Kazancoglu *et al.*, 2021). There are various reasons why RL must be used in the food sector. Shorter product lifecycles are one of them, due to the risk of damage and product expiration, poor-quality product returns, and inability to provide quality abide by excellent production practices. Customers are more likely to return low-quality goods, particularly meat and dairy products. In a synthetic design of an assembly-resumption network combined forward and reverse logistics. They assumed that different types of raw materials are employed at different stages of the forward assembly process. In addition, several types of uncertainty on the reverse and recycle circuits were investigated in this study (Münch *et al.*, 2023).

In the food industry, RL is required to provide consumers with high-quality, safe food that does not endanger human life or the environment (Vlachos, 2014). Food returns, recalls, recycling, reuse, and disposal are all challenges faced by RL in the food industry (Vijayan *et al.*, 2014).

Operationally, in light of gaining a competitive edge, strategies are coordinated towards the results of improved cost-productivity, nature of commodities and innovativeness, consumer assistance, and limited waste (Smith and Landry, 2021). Rationally to gain a competitive advantage, firms assemble solid connections and create networks that remember different firms for the supply chain. The rational results are trust, credibility, and adequacy (Farooque *et al.*, 2019). Through reverse logistics, pricing strategy includes expanding the measure of reusing while at the same time keeping the cost of reusing steady or accomplishing a lower cost while growing the size of remanufacturing. Utilizing associations with external collaborators for expansion requires key strategies supported by decision-making frameworks and structures, as serendipity isn't feasible in an undeniably perplexing and specifically the fresh food industry (Arias Bustos and Moors, 2018). There are different components affecting various stakeholders in the food supply chain; subsequently, interests in both conventional relationship-building instruments and

trust improvement become valuable for expanded joint efforts through time (Touboulic and Walker, 2015).

The failure of food products incorporates foodborne conditions, food contamination, inferior quality food, fake items, or mislabeling and undeclared fixings after production. Each progression and each provider in a food flexibly bind matters to the last food items. Hence, the food supply chain requires higher effectiveness and closer accomplice coordinated effort to keep up the worth chain and wipe out products failure (Nakandala and Lau, 2019). Bosona and Gebresenbet (2013) state the food supply chain requires planning for efficient performance by managing the food cycle, since inappropriate strategies for handling the food product may result in severe consequences, for example, food contamination and item recall. In this manner, the food supply chain requires globally arranged quality affirmation through traceability practice to evade the event of a quality risk. To control product quality to the furthest reaches, it is important to guarantee the correct quality maintainability of management's activities in all supply chain elements. Generally, the traceability framework to a great extent depends on paper based frameworks in PC systems (Aung and Chang, 2014).

Supply chains are typically not planned in concurrence with a risk assessment and appraisal, albeit one of the most basic issues is "the risk management. In the food supply chain where risk aspects may compromise food product quality and wellbeing and in this manner consumers' wellbeing, hazards are significantly less endurable (Maruchek *et al.*, 2011). As of late, analysts have presented some huge model-based investigations to handle COVID-19 issues. Salem and Haouari (2017) built up a three-echelon stochastic improvement model to plan a store network dependent on vulnerabilities in anticipated interest and supply. Reverse logistics gives organizations the prospect to oversee waste and to increment natural proficiency. Reverse logistics activities have different focal points, for example, decreasing utilization resources from raw material, making financial incentives by recuperating waste, improving consumer loyalty, economical energy, decrease in landfills, and lessening gas depletions. Therefore, reverse logistics exercises positively affect ecological issues, give green advantages, and should be considered in a comprehensive view because of the intricate and dynamic nature of reverse logistics.

Risk Management is a basic part of a successful organization's strategy and activity. It is an organized methodology of recognizing, moderating, and evaluating risks to decrease losses. It incorporates three stages to be specific risk identification, risk moderation, risk assessment, and evaluation. A prioritization interaction is followed whereby the risk with the higher loss and the likelihood of happening is handled on a priority basis, and risks with lower chances of occurrences and lower losses are dealt with in plummeting requests. There are two types of risks, internal risks and external risks. The internal risks in reverse logistics incorporate inventory risk, information overseeing risk, time management risk. The outer risks are the ones where the framework associates with an outer climate like natural risk and reevaluating risk (Govindan and Bouzon, 2018).

Sufiyan *et al.* (2019) examined the attributes of certain items (for example organic products, vegetables, meat, and fish) make further difficulties because of fluctuating

characteristic conditions, assortment in quality and amount, long throughput times in essential production, and divergent products flows. The blend of these attributes isn't one of a kind to food items, however, when they are additionally joined with perishability, these qualities need unique consideration as far as logistics operations. Accordingly, the qualities of food items should be considered explicitly. Bask and Rajahonka (2017) states wholesalers and retailers face the issue of consolidating a few distinct items, some of which are short shelf periods with a short timeframe of realistic usability, and some of which are profoundly accessible. Subsequently, we can see that food item have qualities that make a novel setting for the entertainers in the food supply chain that put explicit prerequisites on logistics activities.

To diminish food loss and waste information exchange has been recommended as one of the main ways along the food supply chain. However, the hesitance of food supply chain (FSC) members to exchange data is additionally one of the most testing underlying failures along the food supply chain. The dismay of food supply chain members of losing competitive edge, being presented to advantage, and losing bartering power, ceases them from sharing delicate information (Pibernik *et al.*, 2011). Information structures likewise obstruct RL studies when they are contradictory or insufficient inside an association. Returns are misused or lost if representatives are physically dealing with the items; information frameworks can give data to the internal departments (Ganjali *et al.*, 2014, Wahab *et al.*, 2023). Moreover, training of representatives to participate in reverse logistics is essential and takes monetary help from the association. An absence of interest in reverse logistics information frameworks probably brings about decreased reverse logistics efficiency (Meyer *et al.*, 2017).

The nature of the product, for instance, is significant for all food supply chain members; nonetheless, food supply members may have various definitions or impressions of value which can prompt awkward treatment of the product bringing about post-harvest loss (Arias Bustos and Moors, 2018). Moreover, it involves social, financial, and organizational planning through which contrasts between food supply chain members are first recognized to have the option to utilize them to the benefit of the food supply chain (Cramton and Hinds, 2014). Logistics operations are interrelated also compromises are needed to gain sustainability. An illustration of reliance is a reusable packaging framework that expands asset proficiency, prompting cost investment funds, yet additionally delivers more reverse logistics courses and thusly higher outflows in transport. The point of sustainable logistics is to give essential contentions to convince top management to endorse activities in logistics with deference to the climate.

Packaging is another basic component of food products and a basic source of environmental sustainability and waste (García-Arca *et al.*, 2014). However, Authors applying Life Cycle Assessment (LCA) have evoked packaging for their examination of SFSC. Along with supply chains, foods like vegetables and fruits are moved between dissemination focuses, which suggests the creation of extra waste, for example, pallet and wrap (Kulak *et al.*, 2013). Organizational efficiency could be maximized in good leadership by eliminating the boundaries to RL strategies, instructing workers, and updating RL frameworks. Outer hindrances that influence RL practices are the absence of supply chain

partner reconciliation, the absence of exact anticipating, and government guidelines (Meyer *et al.*, 2017). Feasible organizations can expand the common trust, esteem, and unwavering quality of food supply chain members, subsequently adding to expanded receptiveness and forthrightness along with the food gracefully chain (Tarar *et al.*, 2020). Arias Bustos and Moors (2018) Perceive that effective connotation can, (a) diminish exchange costs, risks, and food supply chain primary shortcomings, (b) upgrade the food supply chain member’s dimensions to enhance and improve their market position, and (c) have a significant commitment to gain a competitive edge.

Technological innovation can prompt improved traceability inside the supply chain; in any case, without satisfactory insurance of IT frameworks, security breaks can lead to the absence of trust among providers and sellers inside the supply network and affect the seriousness of the production network (Mazzarol, 2015). Bottani *et al.* (2019) presented an experimental model explaining energy shortcoming brought about by the presentation of conserving innovation at the back-finish of the food supply chain minus any additional primary changes: because of the absence of trust concerning cooling practices in different pieces of the food supply chain, each first food supply member would superfluously boost cooling, in this way squandering energy and diminishing item's quality. The satisfactory utilization of innovation is subsequently supported by the limit of food supply chain' members to defeat primary inefficiencies.

When transporting perishable goods, factors such as product quality, item health, mode of transport, storage conditions, or different logistics all impact ideal choices. He *et al.* (2018) accepted that the nature of the transitory items during the transportation is straightforwardly connected to time and settled a circulation arranging model by a heuristic methodology.

Han *et al.* (2018) affirmed that the low food miles of nearby food frameworks infer lower fuel utilization, lower CO2 discharge, and fewer appropriation stages contrasted with regular food frameworks. Simultaneously, in any case, different examinations zeroing in on the vehicle stage and dissecting distinctive SFSC designs in various settings arrived at opposing resolutions: as per their discoveries, there was no critical contrast between the absolute energy utilized for food transportation in local and ordinary frameworks, and now and again, customary food frameworks beat the local ones (Paciariotti and Torregiani, 2021). The ecological advantages of short distances can be balanced by various factors, for example, the absence of proficient coordination in vehicle logistics, the expanding utilization of private vehicles, or the regular excursions with low burden factors required (Jose and Shanmugam, 2020).

The following **Table 1** summarizes all the

inefficiencies that emerged from the literature.

Table 1 Summary of Reverse Logistics Inefficiencies in FSC

No.	Issues	Source (Citations)
1	Limited understanding of RL in FSC	(Jose and Shanmugam, 2020, Manzini and Accorsi, 2013, Ringsberg, 2014)
2	Supply Chain Strategy in FSC	(Govindan and Soleimani, 2017, Meyer <i>et al.</i> , 2017)
3	Ineffective Collaboration and Decision Making	(Arias Bustos and Moors, 2018, Farooque <i>et al.</i> , 2019, Smith and Landry, 2021)
4	Information Exchange	(Meyer <i>et al.</i> , 2017, Nakandala and Lau, 2019)
5	Traceability Issues	(Bask and Rajahonka, 2017)
6	Inefficient Risk Management	(Bosona and Gebresenbet, 2013, Duan <i>et al.</i> , 2020, Kaipia <i>et al.</i> , 2013, Shukla and Jharkharia, 2013)
7	Food Waste and Food Loss	(Nascimento <i>et al.</i> , 2022, Salem and Haouari, 2017, Zhao <i>et al.</i> , 2020)
8	Product Variation	(Hodges <i>et al.</i> , 2011, Nascimento <i>et al.</i> , 2022)
9	Quality of Product and Packaging	(Sohail <i>et al.</i> , 2018, Sufiyan <i>et al.</i> , 2019, Verdouw <i>et al.</i> , 2016)
10	Effective Leadership	(Bortolini <i>et al.</i> , 2018)
11	Transportation Planning	(Meyer <i>et al.</i> , 2017, Paciariotti and Torregiani, 2021, Rota <i>et al.</i> , 2018)
12	Use of Technology	(Gharehgozli <i>et al.</i> , 2017, Han <i>et al.</i> , 2018, Tarar <i>et al.</i> , 2020, Usama and Ramish, 2020)

2.1 Comparative Analysis

From different studies, some frameworks related to reverse logistics operation were studied and comparative analysis was done in **Table 2** to identify the outcomes.

Table 2 Comparative Analysis of Previous Frameworks

Frameworks	Focus	Output	Limitation
<p>“Sources of operational inefficiency in pharmaceutical supply chain (Bortolini et al., 2018)”.</p>	<ul style="list-style-type: none"> To find the major reasons of operational inefficiencies in Pharma supply chain PSC. 	<ul style="list-style-type: none"> Following problems are identified <ol style="list-style-type: none"> 1. finance related 2. communication related 3. wastage related 4. complexity related 	<ul style="list-style-type: none"> The study focuses only on the downstream domain of the PSC. Study is region dependent i.e. UK and Greece, that affects the generalizability of research another limitation is this framework is specifically for PSC.
<p>Multi-perspective framework for RL implementation (Meyer et al., 2017, Paciarotti and Torregiani, 2021, Rota et al., 2018)</p>	<ul style="list-style-type: none"> The various views of key stakeholders who put pressure on and obstruct the growth of RL. 	<ul style="list-style-type: none"> Three subcategories of research findings are derived from the literature: RL barriers, RL drivers, and further insights. 	<ul style="list-style-type: none"> The framework must be empirically examined and verified. Other stakeholders may be involved Framework may be applied to other country context An order of importance of actions to overcome RL barriers can also be derived based on the relevance of each barrier.
<p>RL implementation barriers (Gharehgozli et al., 2017, Han et al., 2018, Tarar et al., 2020)</p>	<ul style="list-style-type: none"> Manufacturing firms were chosen that have exhibited, a given degree of RL practices from the literature and are located in cities with a particular level of logistics infrastructures in order to analyze the impediments to RL implementation in China's manufacturing industry. 	<ul style="list-style-type: none"> Barriers to RL implementation in China can be broken down into four main groups: management, finances, policies, and infrastructures. 	<ul style="list-style-type: none"> Although a lack of public knowledge of environmental protection has been widely noted in the literature, the study did not find that it was a significant obstacle for the enterprises included. Similarly, none of the sectors surveyed claimed that customers were unaware of the take-back channel for End-of-Life (EoL) products..
<p>“Major barriers to implementing RL within the construction industry (Papalexi et al., 2020)”.</p>	<ul style="list-style-type: none"> This research analyzed existing works on RL and uncovered a trifecta of obstacles: operational, organizational, and social (work) and environmental difficulties. 	<ul style="list-style-type: none"> The framework includes: <ol style="list-style-type: none"> 1 operational barrier; 2 hurdles relating to the nature of buildings; products, and returned materials; 3 industry-based barriers; 4 regulatory barriers; and 5 local business practice-related barriers. 	<ul style="list-style-type: none"> This empirical study is conducted to build a framework within a specific industry, construction; The population sample is limited in that it is solely from South Australia and the construction business. This means that the findings may not apply to other situations.
<p>“Stakeholders' claims and firm's responses (Govindan and Bouzon, 2018)”.</p>	<ul style="list-style-type: none"> A theoretical model is created that simultaneously incorporates the external, organizational, and human elements; Previous research on RL has shown the role of various pressure groups in the creation of such programs. 	<ul style="list-style-type: none"> The study concludes that the stakeholder salience, the availability of the firm's resources, and a progressive strategic posture of the manager are all important factors in determining the likelihood of firms implanting RL systems. 	<ul style="list-style-type: none"> The primary restriction is that the study was conducted inside a single industry, which restricts the applicability of the findings to other fields. The applicability of our theory to other settings is a question that may be investigated in future studies.

3. METHODOLOGY

A qualitative method was suitable for elaborating the existing research as it will provide in-depth knowledge about the benefits obtained from reverse logistics in the food industry (Abdulrahman *et al.*, 2014). This research study was dependent upon subjective problems and accordingly, qualitative methods and secondary sources were utilized. This study incorporates research articles, case studies, and other literature. The qualitative approach is based on the objectives to expand a better understanding, escalate the framework and its peculiarities, and explore the concerns associated with the reverse logistics inefficiencies in food supply chain industries. In this study, semi-structured sixteen interviews were undertaken with food logistics professionals concerning people of food supply chain within companies in two geographical contexts Pakistan and Malaysia. For data analysis and coding thematic analysis was used. Through primary analysis of the previous studies alluding to the sources of reverse RL inefficiencies in FSC (introduced in Section 2); the yields of which recognized key areas of investigation, which were the potential FSC issues.

The interview guides were sent to concerning persons well ahead of time of the interview in light of their concern over the classification of data. The accessibility of interview advisers for the case associations before the beginning of the interview would be relied upon to have a few points of interest. In a circumstance, where they don't want certain inquiries to be evoked for the discourse with guides, such inquiries could be corrected or erased from the last interview with directors. It will additionally dispense with potential misconceptions of the managers of the case associations towards the exploration subject. To enhance the reliability of data, while interviews questions were repeated in various forms, interviews comprised of analytical and open-ended questions to get a detailed answer and to gain insight. The interview guide was intended to explore the case firms focusing on the operations and logistics departments to identify the inefficiencies. After the collection of data from all four firms, interviews were transcribed to check the accuracy. To attain validity, the triangulation method was adopted, data was collected from multiple sources, interviews were the primary source, and reviews of consumers, reports, and other information from the internet were secondary sources. To get the different perspectives and to view the information in a multi-dimensional manner, multiple interviews were conducted from the case firm.

All the information from transcribed interviews and other observations were coded in NVIVO software using thematic analysis to develop a theoretical framework for identification and mitigation of inefficiencies related to reverse logistics for data analysis in the food supply chain (FSC). The target sample for this study included experts working in logistics and food supply chain industries. As the research plan was to investigate the food supply chain in the domain of reverse logistics, just those experts who work inside this space could be considered as possible members; subsequently, a purposive sampling procedure would be embraced (Hosseini *et al.*, 2015). The validation and impact of purposeful sampling lie in choosing data-rich cases for in-depth analysis. Information-rich cases are those from which one can become familiar with an extraordinary arrangement

about issues of focal significance to the objective or purpose behind the study, in this way the term purposeful sampling. Examining information-rich cases yields experiences and in-depth understanding instead of empirical investigations.

The triangulation method was used to improve the validity of data as far as comprising distinctive material and techniques for each case, just as by allowing several scholars to investigate the equivalent material (Álvarez-Gil *et al.*, 2007). In addition to the interviews, data would be gathered through qualitative and quantitative secondary sources such as media reports and company documents. These documents will be mainly valuable for providing a sense of the historical context for several aspects of the organization and help as significant records of activity.

4. FINDINGS AND ANALYSIS

Some key issues were identified from the analysis of qualitative data, which affect reverse logistics operations. For our ease, the authors have categorized the issues into four types.

1. Complexity issues
2. Communication issues
3. Food waste issues
4. Financial issues

Reverse logistics objectives were developed as shown in **Figure 1**. While conducting interviews with Malaysian interviewees it was obvious that they were facing huge issues related to RL especially related to understanding of foreign regulation and guidelines of managing RL. This validates that there has been limited understanding of RL in the logistics professionals (Jose and Shanmugam, 2020, Ringsberg, 2014).

Improving profitability, retaining customers and saving of costs were the major goals. While costs and time can be optimized, ultimately, it would have a negative effect on the process, if not optimized properly, resulting in managing the overall risk within the RL domain inefficiently (Bosona and Gebresenbet, 2013, Duan *et al.*, 2020).

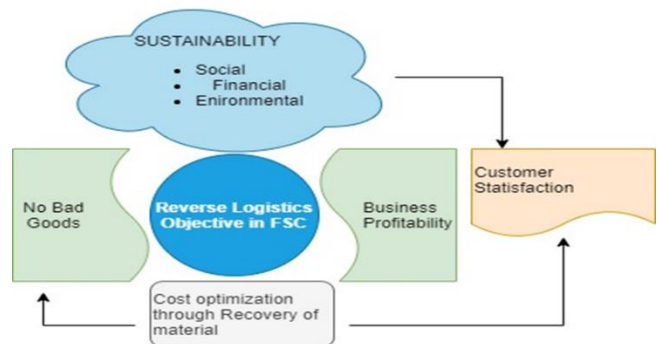


Figure 1 Reverse Logistics Objectives

4.1 Complexity Issues

In reverse logistics, there are main guidance forces that have a maximum influence on the implementation of reverse logistics operations and can contribute to the decision, which can be financial, social, as well as entrepreneurial, and legislative. The utmost risk reported by participants is that excessive care is taken when transporting the material due to line crossings or changes in the mode of transport which led to food waste (Nascimento *et al.*, 2022, Zhao *et al.*, 2020) is

unavoidable, as some respondents put it, "Some materials that are wasted and cannot be consumed by humans go to another level and become animal feed after recycling and reverse logistics". Corporate social responsibility weighs on many characteristics that push an organization or association to consciously face the logistical contrary. Almost all respondents mentioned the possibility of implementing technological and innovative improvements in the reuse of materials as also pointed out in the literature (Gharehgozli *et al.*, 2017, Tarar *et al.*, 2020). Experts said that by reusing materials, costs could be minimized. Supply chains face constant calamities and the risk of growing demand from customers and B2B buyers. As organizations seek an effective solution to meet growing needs, it is not difficult to abandon sustainability goals and focus solely on achieving the goals. In any case, giving up on innovation in reverse logistics and remaining optimistic is the most worrying outcome possible. This is not a good strategy and only leads to failure (Govindan and Soleimani, 2017, Meyer *et al.*, 2017). Company B's director of customer service described customer feedback as "the ticking time bomb of multi-channel retail. The exchange of information is the key element because forecasting future demand has become an issue with the lack of required information". According to members, especially in private and corporate facilities, materials are reused separately based on customer demands. As the manager of Company C said, "customers may not like reused materials if they don't have a detailed mechanism. Also, some members show that customers who are government agencies and knowledgeable organizations are happy to reuse materials enhancing managing the overall supply chain knowledge in a better way (Ramish and Aslam, 2016). Once the organization can demonstrate the viability of the expense and the ability to complete the necessary details, customers will be satisfied because the completion is within normal standards. Traditional logistics innovations, such as reverse logistics innovation, are prone to failure. However, integrated rotational logistics innovation research can be found to shed light on these failures and help supply chain professionals take action and refine decisions. The research also covers a wide range of applications within the reverse logistics network, such as route and carrier selection for executive returns, monitoring of community-specific exit notices, reconnaissance, and advice to potential consumers or advice clients. As reverse logistics exchanges have shifted to e-commerce, the need for a more powerful reverse logistics process has become more important to keep up with business growth. Remember that all online purchases have a fundamentally higher rate of return than traditional retailers, up to several times.

4.2 Communication Issues

Complications related to the exchange of information or communications (Meyer *et al.*, 2017, Nakandala and Lau, 2019) are an obstacle because they have hurt the delivery process and the quality and safety of the product. Technological innovation was needed to improve emergency practices, but there were no funds to invest in emergency operations. Communication issues were another important element that could affect the exact transportation of materials (Meyer *et al.*, 2017, Paciarotti and Torregiani, 2021, Rota *et al.*, 2018); the presence of discontinuities and duplications in

the food sector was recognized. As company executives A, C, and D state, "there was a regular lack of communication between secondary and critical considerations, which added to duplication time in organizations". Company B's customer service manager clarified that it is really difficult to contact our supplier if we want additional data; there are no unexpected awkward interactions, which can increase the risk of losing users or making them dissatisfied. A Malaysian respondent from Company D said, "there is a wide range of products and there is no specific strategy for a specific type of product to recycle products. These activities create delays and waste in the creation of care, which creates shortages and associated expenses". All manufacturers, wholesalers, and retailers must participate in reverse logistics operations to achieve the goal of optimization. For this reason, their ability to effectively approach the logistics process reverse will become essential, especially for manufacturers and retailers currently working. According to interviews with the interviewees, A and B said: "reverse logistics manages product returns, presents one of the biggest challenges functional in the area of reuse, as companies encompass many product lines and will generally be reduced". Some of these challenges include issues with collecting returns, organizing returned items, misuse of returns, loss of customer's confidence in returns, credit approval, and an extensive claims management process and hassles with environmental sustainability. Getting all partners on board can be helpful in further developing efficiency and effective exchange of information (Arias Bustos and Moors, 2018, Farooque *et al.*, 2019, Smith and Landry, 2021); however, this can also be a constraint due to the particular degree of awareness and structures. Operational visibility is essentially what type of product will be returned? And why? There is a persistent lack of clarity in the entire reverse logistics process.

4.3 Financial Issues

The principal subject is identified with the economical or financial issues that the food industry needs to manage. A basic issue recognized as the significant expense of the transported directions. The supply chain manager of firm A expressed, "food retaining teams have broadly focused on the food consumption". Attempting to maximize efficiency, explicit financial plans are distributed to every food business. Firms B's manager clarified that we can't spend more than the financial plan that has been distributed for us, which is roughly 30M per annum. Along these lines, local area superstores need to thoroughly deal with the mind-boggling transportation framework to have the option to foresee the interest, fulfill their customers, and control their costs. The spending plan spent on food relies upon the business size and the market interest. The food industry in Pakistan attempts to keep the customer at the essential level and this has been viewed as a method of decreasing the expense of organizations. Firms B supply chain heads clarified that there is a major push to lessen the interest for secondary food businesses since they are costly. There is a marginally unique view in food services associations in Malaysia; they will quite often keep customers to stay away from any risks related to their well-being (Bosona and Gebresenbet, 2013, Duan *et al.*, 2020, Shukla and Jharkharia, 2013), even though they recognize that this training is excessively costly. Most

of interviewees concurred that any improvement requires new technologies, which are not accessible to convert waste into useful energy (for example interviewees of Firm A, B & C).

4.4 Food Waste Management Issues

The fourth theme identifies food waste due to the obstacle of the efficiency of the food supply chain and the logistics process is food waste throughout the process (Nascimento *et al.*, 2022, Salem and Haouari, 2017, Zhao *et al.*, 2020). The companies in the sample admitted that the largest volume of waste comes from the current facility itself. Solid waste management is one of the most important concerns for local governments, as it requires a significant amount of money and effort to collect and dispose of solid waste. In Malaysia, Pakistan, and many other poor countries, the typical approach to end-of-life products is to throw them away or incinerate them, which has a high cost and causes environmental damage. Additionally, respondents suggested that most rejections occur due to miscommunication and a lack of synchronization between indirect communication between customers and the company. "The goal is to correct problems, reduce material waste and reduce labor hours". Usually, food loss occurs before the food reaches the consumer due to problems in the production, storage, handling, and appropriation phases. The goods are identified with the degree of the waste that exists within the FSC. Additionally, respondents from Malaysia (respondent D) accept that waste is produced by the standard; individuals do not return material that could be reused, such as glass bottles from the beverage industry. Beyond the point of view of local retailers, FSC specialists admit that the primary waste comes from a lack of communication and the lack of synchronization between the customer and the company (Arias Bustos and Moors, 2018, Farooque *et al.*, 2019). Use of technology could eliminate such issues e.g. RFID as it has been extensively used in retail industry (Khayyam *et al.*, 2022). The Malaysian company that uses waste a bit better than Pakistan and turns its waste into energy, as one interviewee said, "... haven't seen any new technology. There are conventional methods. We can automate the complaint processes, we can automate the whole flow of information, but ultimately you have to move the product or destroy the products. Information flows can be automated. The recovery and destruction of the product are carried out by conventional techniques".

The nature of the elements used and the nature of the fulfillment of commitments at the various stages of the supply chain must be taken into consideration. All interested parties believe that the overall nature of the materials used should be equivalent or superior to the nature of the new materials as it is illegal to use substandard materials in Malaysia. Therefore, both new and used materials must meet reverse logistics purposes to be used for development purposes. Accompanying member statements prove the thesis: "If the material essentially follows the new material, it can be used" (Quality Assurance Manager C); "...each of the items reused, the primary concern had to be of

substantially equivalent or better quality" (Company B's purchasing manager). Many respondents believe that the materials used, like recycled materials, often fall and should be moved to the necessary level of quality: "Well, if it's recycled material, it's detached from another structure. We will have dropouts. and that fled, these imperfections must then, at that time, be repaired before they can be used again"; "If they pass the grit, they are considered free of deformity" (the company responsible for supply chain A); "It is tested and when the result is abandoned it is replaced or repaired" (Company B of the customer service manager) Although the reused items have all the necessary data, there is a lack of adequate data for the different materials. For example, "... there is not much data (supply chain company B)"; "no such data." (Company A's supply chain manager). However, some members agree that some data is accessible, but still, more is needed, 'I don't think we have a total record' (Leader of Company A). Meanwhile, a member shows that linked data design is absent: "There is general data but explicit data developments that I haven't seen" (director of company B).

Figure 2 explains the common issues observed in Pakistan and Malaysia.

5. DISCUSSION

In this discussion section, clarity of the findings and analysis is discussed to provide a solution and action plan to the above findings and analysis.

This section is mainly divided into three main domains:

- 1-*reverse logistics objectives in the food supply chain*
- 2-*the common factors of reverse logistics inefficiencies between pakistan and malaysia.*
- 3-*the action plan to overcome observed inefficiencies rl in the food supply chain.*

Reverse logistics associated with RL and FSC practices are limited, which expands the complexity of the RL framework. The food industry focuses more on the quality of the product rather than reusing and recycling of material (Sohail *et al.*, 2018, Sufiyan *et al.*, 2019, Verdouw *et al.*, 2016); hence, high capabilities and administration are required to make changes in existing traditional approaches. It was proposed that these capabilities could take care of stock management issues and subsequently further advance the delivery process. It is obvious, along these lines, that the partners required inside the FSC require major information to have the option to best utilize the resources, keep away from the duplication in services and accordingly further advance consumer loyalty.

Furthermore, the data analysis assumes that a loss is created within the FSC due to the lack of correspondence and synchronization between the FSC partners (Arias Bustos and Moors, 2018, Farooque *et al.*, 2019, Smith and Landry, 2021). From the analysis of the data, it emerges that an impulse set up with the stakeholders is based on concern, which provides for regulation on the quantity and a forecast of the return of the product.

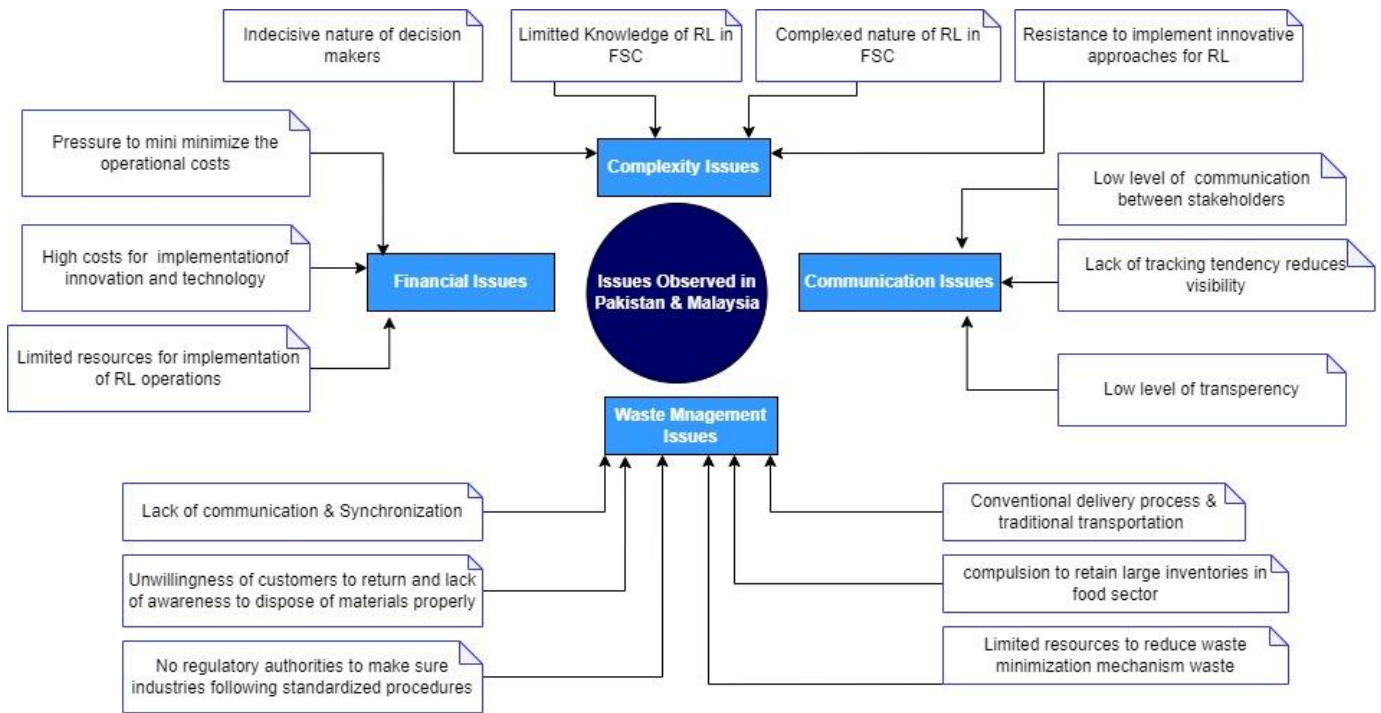


Figure 2 Issues Observed in Pakistan and Malaysia

In the following **Table 3**, a few issues are mentioned associated with FSC in different contexts of Pakistan and Malaysia.

Table 3 Issues Associated with FSC

In context of Pakistan	In context of Malaysia
<ul style="list-style-type: none"> • Strong Pakistani Agriculture Culture • Existence of multiple food suppliers • No RL strategy or framework for efficient logistics • Lack of awareness in both upstream and downstream of FSC • No implementation of environmental laws • Increase in the level of wastage because of inefficient logistics 	<ul style="list-style-type: none"> • Weak Agriculture Culture • Existence of low numbers of food supplier • No specific strategy related to product lines • Lack of awareness downstream of FSC

To cope with inefficiencies identified from findings and data analysis shown in **Figure 3** an action plan is given and points are listed down which is beneficial for managers and organizations to implement Reverse logistics practices effectively and efficiently.

Reverse logistics mostly alludes to issues of traceability with an unusual focus on highly transient food products dependent on rapid disintegration (Bask and Rajahonka, 2017). A powerful food visibility framework is an important tool not only for overseeing food quality and safety but also for advancing the improvement of FSC's functional frameworks. Transforming events and implementing such

discovery frameworks for the FSC is a viable way to keep explicit, especially transitional food products for more, new items, simultaneously and with wellness and quality standards. As discussed above information technology was the basic theme identified in data analysis. Through optimization of information technology, inventory levels could be decreased by accurate forecasting in warehouses, by its implementation cost could be minimized and by assessing faulty order dispatches could be decreased which would ultimately lead to cost minimization, the time associated with returned material would also be decrease and organizations will ultimately achieve customer satisfaction. By investing in technology to incorporate inventory management systems in the food supply chain returns could be achieved effectively and forecasting of returns will be improved as well. For example, in a recent pandemic situation when COVID was spread everywhere and most of the business shifted to remotely working so through good technology communication could also be done in a better and more efficient way. There should be a plan or specific strategy to deal with the reuse and recycling of products. If an organization has a proper system or strategy specific to product or business organization can respond quickly, reducing risk, customer dissatisfaction, and attaining business profitability. For example, as we had seen in data finding and analysis beverages and food industry could have a proper transportation plan so no truck comes back empty and get empty bottles for reuse to minimize the overall cost and also supports sustainability.

Outsourcing is a suitable business technique since turning non-center capacities over to outside providers empowers organizations to use their assets, share risk, and focus on issues basic to endurance and future development. Many firms have gone to logistics reevaluating as a way of rebuilding their dispersion organizations and gaining a

competitive edge. Utilization of an outsider logistics supplier for all or part of an association's logistics tasks has become drastically throughout the most recent quite a long while. Logistics re-appropriating has progressively turned into a compelling way of lessening expenses and extent risks for conventional, in an upward direction incorporated firm. This is a clear change to make. By doing this we can reduce delays significantly, while at the same time further developing consumer loyalty. As a rule, the retailer can line pay on the usage tag in the receipt. It would then be able to be set on a sticker that the customer can essentially strip off and fly onto the item for an issue-free return. In addition to the fact that this helps the client, it additionally returns the item once again to the retailer considerably more rapidly, working on the productivity of the whole process. Rather than missing the mark regarding customer assumptions, retailers should acclimate to the expanding pervasiveness of profits. That implies planning supply chains to handle both outward and internal items with the greatest productivity.

A rationalized reverse logistics inventory network can assist retailers with decreasing returns, further developing customer benefits, and better-overseeing resource recovery. Practically speaking, reverse logistics can end up being an exceptionally mind-boggling undertaking. Be that as it may, even little and straightforward changes can create exceptional outcomes. Through legal observing and an emphasis on consumer loyalty, any retailer can lessen costs, limit calamities, and lift customer preservation. Transportation costs could also be reduced if properly planned routes are used. By supplying the product, the same vehicles can collect product returns for reuse and recycling of the material. As from the data analysis, we had seen the problem of lack of planning, so by optimizing technology and effective decision making, we could avoid empty return routes and poorly packed trucks that result in unnecessary mileage and increased costs and would also help reduce air pollution leading to environmental sustainability (Gharehgozli *et al.*, 2017, Han *et al.*, 2018, Tarar *et al.*, 2020, Usama and Ramish, 2020).

End users should be rewarded for returning products to the reverse chain to improve the amount of each material recovered. Using segmented vehicles or bagging the products is another option for gathering small quantities. This form of collecting necessitates intermediate storage space for each product, as well as deferring the segregation phase, making it more complex and expensive. It is not possible to mix the same trusses for hygiene concerns. As a result, a more decentralized system with smaller storage centers is required. In this instance, postponing can be a good option. Employee involvement in green initiatives enhances green management by aligning employee goals, skills, motivations, and perceptions with green management methods and systems. According to some researchers, individual empowerment has a favorable impact on productivity and performance. Interactions between employees should be broadened by establishing a suggestion system within the company. This activity will help raise awareness of environmental challenges, as well as generate new ideas for environmentally friendly behavior. Other advantages of employee engagement include improved personal and collective health and safety, as well as the

development of environmentally conscious employees. We argue that through enforcing the policies, long-term trust between management and employees will be established, allowing people to express their ideas at work and leading to the creation of an environment suitable to green management procedures and performance.

In a massive country like Pakistan, effectively implementing an economically feasible reverse logistics operation is difficult. The market for recycled waste is still growing and is extensively distributed. There are only a few buyers, especially in large cities, and a large number of merchants across the country. When compared to the equivalent price of raw materials, shipping costs made many recycled materials operations unprofitable. There are several uncertainties in the recyclable market, particularly those linked to seasonality and the quality of recyclable materials. These factors raise the cost of employing recyclable materials in most items with a larger aggregate value. Reverse logistics chains were made possible by public policies such as the National Waste Management Policy. The shared responsibility (EPR) should be reinforced to make it more operational.

6. CONCLUSION

The objective of this research study was to evaluate the key sources of reverse logistics inefficiencies in the food supply chain (FSC). The identified issues are used to give an action plan to make improvements in reverse logistics implications and to enhance the capacity of business by improving delivery processes and by implementing reverse logistics strategies. However, in literature, there is a lot of research that explores operational inefficiencies but there was a gap identified to consider reverse logistics in FSC and also as did a cross-case comparative analysis to develop a framework. Specifically, this research extends the work of some previous studies and contributes to giving academic literature by exploring the domain of reverse logistics in FSC for future research. This study also contributes to rectifying these issues by developing a framework that entails an action plan to improve RL practices.

Subsequently, the reverse logistics in FSC involves multiple steps; opportunities are there to design a framework by the implementation of new technology and innovation and by the R&D department, to save cost in each step and interface between business stakeholders. Firms must collaborate to minimize the cost and to utilize time efficiently by sharing necessary information between supply chain partners. With the relevance of reverse logistics and the evolving importance of sustainability, it is necessary to carefully utilize the resources and make the delivery process effective. Moreover, the existing software of ERP and SAP has great potential to implement RL practices. During research faced some challenges one of the major challenges were associated with accessing the required information. Professionals working in the food supply chain have a lot of workloads and it was difficult for them to participate. Moreover, this research study only focuses on inefficiencies in the manufacturing part of reverse logistics.

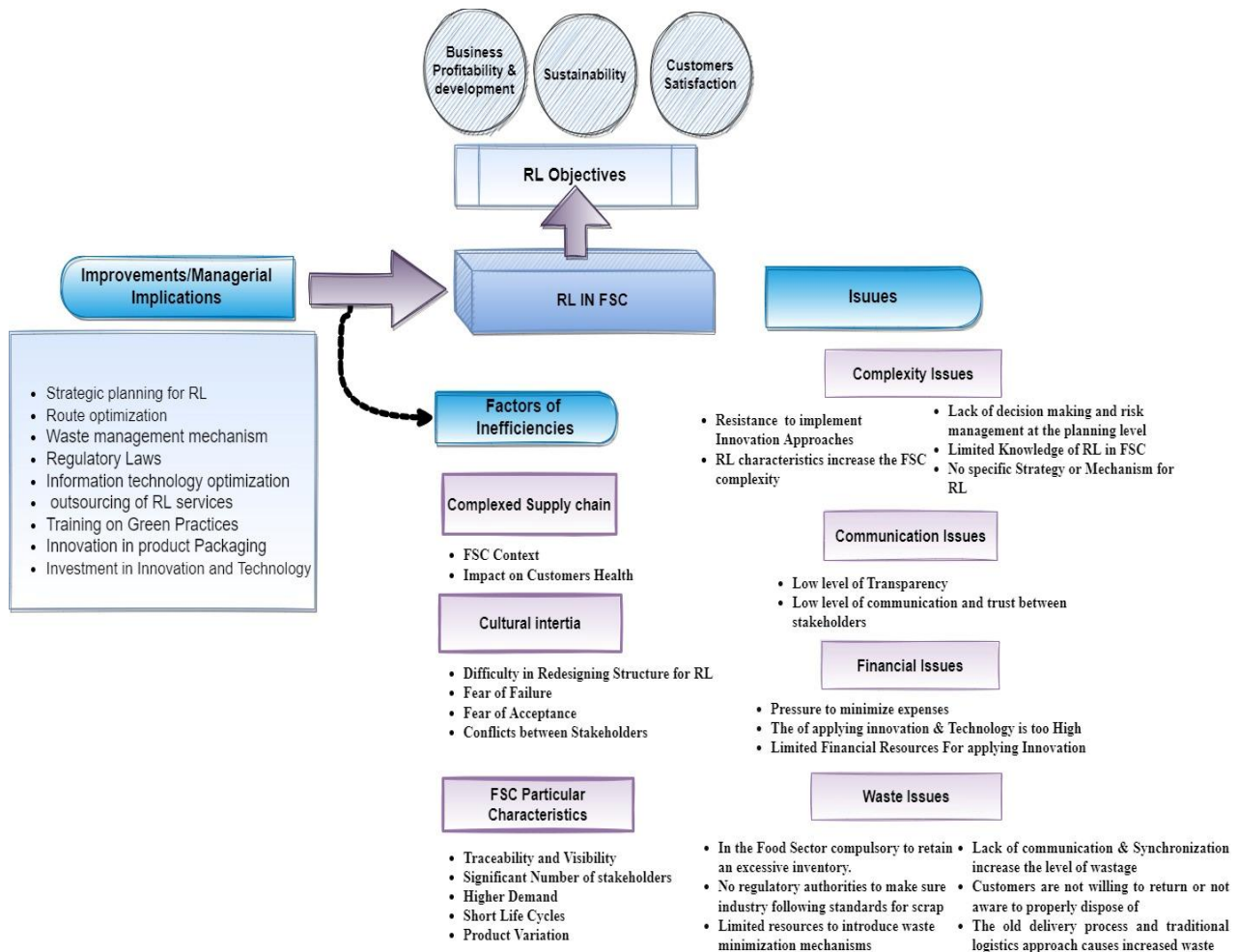


Figure 3 Framework of RL Issues and Suggested Managerial Implications for Improvement

Another challenge in data collection was related to geographical distance so only potential participants could be reached that’s why there is a difference between responses from Pakistan and Malaysia sample size. Lastly, the last limitation of this study is from data analysis, as the study based on qualitative research and thematic analysis was done to develop a framework so there might be changes to influence the interpretation of results. Also, it was acknowledged that the ultimate objective of the study was difficult to achieve as in most qualitative social studies. However inputs from the interviewees are mentioned to mitigate this factor. This research study was based on RL inefficiencies related to mostly downstream of FSC. It would be valuable as well to examine the FSC operational inefficiencies as a whole and to manage the whole.

Moreover, this research study was based on qualitative research; a more quantitative study could be possible to get more insight results from this study. This strategy, by the analysis of issues that emerged using interviews and observation construct validity, could be checked and this would help the organizations to emphasize those components that are responsible for the inefficiency of RL practices. And thus, this will help the managers in decision making. From the theoretical perspective, this study shows another opportunity for future research to give a framework for innovative approaches that should be applied to improve the performance of FSC. In addition to this study, research is

focused on two countries specifically and their delivery process, future research is required to provide a reverse logistics strategy that could be adopted by different countries and beyond these boundaries. This study focused on FSC similarly in future research to enhance the generalizability other sectors should be considered and also can consider RL inefficiencies in SMEs.

REFERENCES

- Abdulrahman, M. D., Gunasekaran, A. and Subramanian, N. (2014), Critical Barriers in Implementing Reverse Logistics in The Chinese Manufacturing Sectors, *International Journal of Production Economics*,147, pp. 460-471.
- Adebayo, T. (2022), An Evaluation of Reverse Logistics Responsiveness and Customer Satisfaction in Retailing, *International Journal of Research in Business and Social Science*,11(1), pp. 93-98.
- Álvarez-Gil, M. J., Berrone, P., Husillos, F. J. and Lado, N. (2007), Reverse Logistics, Stakeholders' Influence, Organizational Slack, and Managers' Posture, *Journal of Business Research*, 60(5), pp. 463-473.
- Arias Bustos, C. and Moors, E. H. M. (2018), Reducing Post-Harvest Food Losses Through Innovative Collaboration: Insights from The Colombian and Mexican Avocado Supply Chains, *Journal of Cleaner Production*,199, pp. 1020-1034.
- Aung, M. M. and Chang, Y. S. (2014), Traceability in a Food Supply Chain: Safety and Quality Perspectives, *Food Control*, 39, pp. 172-184.
- Bask, A. and Rajahonka, M. (2017), The Role of Environmental

- Sustainability in The Freight Transport Mode Choice, *International Journal of Physical Distribution & Logistics Management*, 47(7), pp. 560-602.
- Bortolini, M., Galizia, F. G. and Mora, C. (2018), Reconfigurable Manufacturing Systems: Literature Review and Research Trend, *Journal of Manufacturing Systems*, 49, pp. 93-106.
- Bosona, T. and Gebresenbet, G. (2013), Food traceability as an integral part of logistics management in food and agricultural supply chain, *Food Control*, 33(1), pp. 32-48.
- Bottani, E., Murino, T., Schiavo, M. and Akkerman, R. (2019), Resilient Food Supply Chain Design: Modelling Framework and Metaheuristic Solution Approach, *Computers & Industrial Engineering*, 135, pp. 177-198.
- Cheng, A. L., Kang, Y. K., Chen, Z., Tsao, C. J., Qin, S., Kim, J. S., Luo, R., Feng, J., Ye, S., Yang, T. S., Xu, J., Sun, Y., Liang, H., Liu, J., Wang, J., Tak, W. Y., Pan, H., Burock, K., Zou, J., Voliotis, D. and Guan, Z. (2009), Efficacy and safety of sorafenib in patients in the Asia-Pacific region with advanced hepatocellular carcinoma: a phase III randomised, double-blind, placebo-controlled trial, *Lancet Oncol*, 10(1), pp. 25-34.
- Cramton, C. D. and Hinds, P. J. (2014), An Embedded Model of Cultural Adaptation IN Global Teams, *Organization Science*, 25(4), pp. 1056-1081.
- Duan, J., Zhang, C., Gong, Y., Brown, S. and Li, Z. (2020), A Content-Analysis Based Literature Review in Blockchain Adoption Within Food Supply Chain, *International Journal of Environmental Research and Public Health*, 17(5), p. 1784.
- Dunne, J. B., Chambers, K. J., Giombolini, K. J. and Schlegel, S. A. (2010), What Does 'Local' Mean in The Grocery Store? Multiplicity in Food Retailers' Perspectives on Sourcing and Marketing Local Foods, *Renewable Agriculture and Food Systems*, 26(1), pp. 46-59.
- Farooque, M., Zhang, A. and Liu, Y. (2019), Barriers to Circular Food Supply Chains in China, *Supply Chain Management: An International Journal*, 24(5), pp. 677-696.
- Folkerts, H. and Koehorst, H. (1997), Challenges in International Food Supply Chains: Vertical Co-Ordination in The European Agribusiness and Food Industries, *Supply Chain Management: An International Journal*, 2(1), pp. 11-14.
- Ganjali, M., Shirouyehzad, H. and Shahin, A. (2014), Analyzing Indexes of Agile Reverse Logistics Using Interpretive Structural Modeling Approach, *Journal of Modern Processes in Manufacturing and Production*, 3(3), pp. 5-16.
- García-Arca, J., Prado-Prado, J. C. and Gonzalez-Portela Garrido, A. T. (2014), "Packaging Logistics": Promoting Sustainable Efficiency in Supply Chains, *International Journal of Physical Distribution & Logistics Management*, 44(4), pp. 325-346.
- Gharehgozli, A., Iakovou, E., Chang, Y. and Swaney, R. (2017), Trends in Global E-food Supply Chain and Implications for Transport: Literature Review and Research Directions, *Research in Transportation Business & Management*, 25, pp. 2-14.
- Govindan, K. and Bouzon, M. (2018), From A Literature Review to A Multi-Perspective Framework for Reverse Logistics Barriers and Drivers, *Journal of Cleaner Production*, 187, pp. 318-337.
- Govindan, K. and Soleimani, H. (2017), A Review of Reverse Logistics and Closed-Loop Supply Chains: a Journal of Cleaner Production focus, *Journal of Cleaner Production*, 142, pp. 371-384.
- Han, M. Y., Chen, G. Q. and Li, Y. L. (2018), Global Water Transfers Embodied in International Trade: Tracking Imbalanced and Inefficient Flows, *Journal of Cleaner Production*, 184, pp. 50-64.
- He, Y., Huang, H., Li, D., Shi, C. and Wu, S. J. (2018), Quality and Operations Management in Food Supply Chains: A Literature Review, *Journal of Food Quality*, 2018, p. 7279491.
- Hodges, R. J., Buzby, J. C. and Bennett, B. (2011), Postharvest Losses and Waste in Developed and Less Developed Countries: Opportunities to Improve Resource Use, *The Journal of Agricultural Science*, 149(S1), pp. 37-45.
- Hosseini, M. R., Rameezdeen, R., Chileshe, N. and Lehmann, S. (2015), Reverse Logistics in The Construction Industry, *Waste Management & Research*, 33(6), pp. 499-514.
- Janjevic, M., Nsamzinshuti, A., Rigo, N. and Ndiaye, A. (2017), "Applying The Supply Chain Operations Reference (Scor) Model for The Evaluation of Several Urban Consolidation Centre Operating Models", in *Proceedings of the 3rd World Conference on Supply Chain Management*, Vol. 2, pp. 70-91.
- Jose, A. and Shanmugam, P. (2020), Supply Chain Issues in SME food Sector: A Systematic Review, *Journal of Advances in Management Research*, 17(1), pp. 19-65.
- Kaipia, R., Dukovska-Popovska, I. and Loikkanen, L. (2013), Creating Sustainable Fresh Food Supply Chains Through Waste Reduction, *International Journal of Physical Distribution & Logistics Management*, 43(3), pp. 262-276.
- Kazancoglu, Y., Ekinci, E., Mangla, S. K., Sezer, M. D. and Kayikci, Y. (2021), Performance Evaluation of Reverse Logistics in Food Supply Chains in A Circular Economy Using System Dynamics, *Business Strategy and The Environment*, 30(1), pp. 71-91.
- Khayyam, S., Ramish, A., Ur Rehman, K. and Syed, A. R. (2022), Strategizing Radio Frequency Identification (RFID) in the Retail Supply Chains of Pakistan: A Multiple Case Study, *Operations and Supply Chain Management: An International Journal*, 15(1), pp. 27-40.
- Kulak, M., Graves, A. and Chatterton, J. (2013), Reducing Greenhouse Gas Emissions with Urban Agriculture: A Life Cycle Assessment perspective, *Landscape and Urban Planning*, 111(pp. 68-78.
- Manzini, R. and Accorsi, R. (2013), The New Conceptual Framework for Food Supply Chain Assessment, *Journal of Food Engineering*, 115(2), pp. 251-263.
- Maruchek, A., Greis, N., Mena, C. and Cai, L. (2011), Product Safety and Security in the Global Supply Chain: Issues, Challenges and Research Opportunities, *Journal of Operations Management*, 29(7), pp. 707-720.
- Mazzarol, T. (2015), SMEs Engagement with E-Commerce, E-Business and E-Marketing, *Small Enterprise Research*, 22(1), pp. 79-90.
- Meyer, A., Niemann, W., Mackenzie, J. and Lombaard, J. (2017), Drivers and Barriers of Reverse Logistics Practices: A Study of Large Grocery Retailers in South Africa, *Journal of Transport and Supply Chain Management*, 11(1), pp. 1-16.
- Münch, C., von der Gracht, H. A. and Hartmann, E. (2023), The Future Role of Reverse Logistics as a Tool for Sustainability in Food Supply Chains: a Delphi-Based Scenario Study, *Supply Chain Management: An International Journal*, 28(2), pp. 262-283.
- Mutingi, M. (2013), Developing Green Supply Chain Management Strategies: A Taxonomic Approach, *Journal of Industrial Engineering and Management*, 6(2), pp. 525-546.
- Nakandala, D. and Lau, H. C. W. (2019), Innovative Adoption of Hybrid Supply Chain Strategies in Urban Local Fresh Food Supply Chain, *Supply Chain Management: An International Journal*, 24(2), pp. 241-255.
- Nascimento, A. M., Queiroz, A., de Melo, V. V. and Meirelles, F. S. (2022), Applying Artificial Intelligence to Reduce Food Waste in Small Grocery Stores.
- Paciarotti, C. and Torregiani, F. (2021), The Logistics of The Short Food Supply Chain: A Literature Review, *Sustainable Production and Consumption*, 26, pp. 428-442.
- Papalexi, M., Bamford, D. and Breen, L. (2020), Key Sources of Operational Inefficiency in The Pharmaceutical Supply Chain, *Supply Chain Management: An International Journal*, 25(6), pp. 617-635.
- Pibernik, R., Zhang, Y., Kerschbaum, F. and Schröpfer, A. (2011),

- Secure Collaborative Supply Chain Planning and Inverse Optimization – The JELS model, *European Journal of Operational Research*, 208(1), pp. 75-85.
- Pujawan, I. (2016), Operations and Supply Chain Management: Toward Ten Years of Journey, *Operations and Supply Chain Management: An International Journal*, 10(1), pp. 1-3.
- Pulker, C. E., Trapp, G. S. A., Scott, J. A. and Pollard, C. M. (2018), Global Supermarkets' Corporate Social Responsibility Commitments to Public Health: A Content Analysis, *Globalization and Health*, 14(1), p. 121.
- Ramish, A., A Hamid, A. B. and Nadarajah, D. (2022), Service Supply Chain (SSC): A Systematic Literature Review (1999-2020), *Operations and Supply Chain Management: An International Journal*, 15(2), pp. 280-302.
- Ramish, A. and Aslam, H. (2016), Measuring Supply Chain Knowledge Management (SCKM) Performance Based on Double/Triple Loop Learning Principle, *International Journal of Productivity and Performance Management*, 65(5), pp. 704-722.
- Rejeb, A., Keogh, J. G. and Rejeb, K. (2022), Big Data in The Food Supply Chain: A Literature Review, *Journal of Data, Information and Management*, 4(1), pp. 33-47.
- Ringsberg, H. (2014), Perspectives on Food Traceability: A Systematic Literature Review, *Supply Chain Management: An International Journal*, 19(5/6), pp. 558-576.
- Rota, C., Pugliese, P., Hashem, S. and Zanasi, C. (2018), Assessing The Level of Collaboration in The Egyptian Organic and Fair Trade Cotton Chain, *Journal of Cleaner Production*, 170(pp. 1665-1676.
- Salem, R. W. and Haouari, M. (2017), A Simulation-Optimisation Approach for Supply Chain Network Design Under Supply and Demand Uncertainties, *International Journal of Production Research*, 55(7), pp. 1845-1861.
- Sathiyagothai, B. and Saravanan, S. (2017), Reverse Logistics in Food Processing Industries in India, *International Journal of Economics & Management Sciences*, 6(2), pp. 1-4.
- Shukla, M. and Jharkharia, S. (2013), Agri-fresh produce supply chain management: A State-Of-The-Art Literature Review, *International Journal of Operations & Production Management*, 33(2), pp. 114-158.
- Smith, T. A. and Landry, C. E. (2021), Household Food Waste and Inefficiencies in Food Production, *American Journal of Agricultural Economics*, 103(1), pp. 4-21.
- Sohail, M., Sun, D.-W. and Zhu, Z. (2018), Recent Developments in Intelligent Packaging for Enhancing Food Quality and Safety, *Critical Reviews in Food Science And Nutrition*, 58(15), pp. 2650-2662.
- Sufiyan, M., Haleem, A., Khan, S. and Khan, M. I. (2019), "Analysing Attributes of Food Supply Chain Management: A Comparative Study", in Shanker, K., Shankar, R. and Sindhvani, R. (eds), *Advances in Industrial and Production Engineering, Singapore*, pp. 515-523.
- Tarar, O. M., Ahmed, K. M., Nishtar, N. A., Achakzai, A. B. K., Gulzar, Y., Delles, C. and Al-Jawaldeh, A. (2020), Understanding the Complexities of Prevalence of Trans Fat and Its Control in Food Supply in Pakistan, *The Journal of Clinical Hypertension*, 22(8), pp. 1338-1346.
- Touboullic, A. and Walker, H. (2015), Love Me, Love Me Not: A Nuanced View on Collaboration in Sustainable Supply Chains, *Journal of Purchasing and Supply Management*, 21(3), pp. 178-191.
- Usama, M. and Ramish, A. (2020), Towards A Sustainable Reverse Logistics Framework/Typologies Based on Radio Frequency Identification (RFID), *Operations and Supply Chain Management: An International Journal*, 13(3), pp. 222-232.
- Verdouw, C. N., Wolfert, J., Beulens, A. and Rialland, A. (2016), Virtualization of Food Supply Chains with The Internet of Things, *Journal of Food Engineering*, 176(pp. 128-136.
- Vijayan, G., Kamarulzaman, N. H., Mohamed, Z. A. and Abdullah, A. M. (2014), Sustainability in Food Retail Industry Through Reverse Logistics, *International Journal of Supply Chain Management*, 3(2), pp. 11-23.
- Vlachos, I. P. (2014), Reverse Food Logistics During The Product life Cycle, *International Journal of Integrated Supply Management*, 9(1-2), pp. 49-83.
- Wahab, S., Ahmed, N. and Uzir, M. U. (2023), Healthcare Supply Chain System Challenges and Mitigation Measures: A Systematic Review of Qualitative Evidence, *Operations and Supply Chain Management: An International Journal*, 16(2), pp. 164-176.
- Wognum, P. M., Bremmers, H., Trienekens, J. H., van der Vorst, J. G. A. J. and Bloemhof, J. M. (2011), Systems for Sustainability and Transparency of Food Supply Chains – Current Status and Challenges, *Advanced Engineering Informatics*, 25(1), pp. 65-76.
- Zhao, S., Lin, Q., Ran, J., Musa, S. S., Yang, G., Wang, W., Lou, Y., Gao, D., Yang, L., He, D. and Wang, M. H. (2020), Preliminary Estimation of The Basic Reproduction Number of Novel Coronavirus (2019-nCoV) in China, from 2019 to 2020: A Data-Driven Analysis in The Early Phase of The Outbreak, *International Journal of Infectious Diseases*, 92, pp. 214-217.

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