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ANALYSING THE IMPACT OF FACTORS ON CHALLENGES AND BARRIERS IN SUPPLY CHAIN MANAGEMENT IMPLEMENTATION IN THE SRI LANKAN RETAIL INDUSTRY DURING COVID-19

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ABSTRACT

The primary purpose of this research study is to analyse the impact of factors on challenges and barriers faced by the retail industry in Sri Lanka in implementing supply chain management (SCM) amidst the COVID-19 situation. Furthermore, this study attempts to examine the mitigating strategies of challenges and obstacles to implementing SCM under disaster situations. The study sample comprised 52 individuals (out of 208 individuals directly engaged with supply chain activities) from six selected supermarket chains operating within Sri Lanka, and the data was collected using a questionnaire. Descriptive statistics were used to measure the degree of internal and external challenges and barriers to implementing SCM. Correlation and regression analysis were performed to identify the relationship between selected independent variables and the challenges and barriers of implementing SCM. The findings indicated a positive relationship between selected independent variables and the challenges and barriers of implementing SCM within the Sri Lankan retail industry. The study recommends effective actions to successfully implement SCM within the retail industry in Sri Lanka amidst the COVID-19 situation.

Keywords: Challenges and Barriers, COVID-19, Mitigating Strategies, Retail Industry, Sri Lanka, Supply Chain Management

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1 INTRODUCTION

SCM and accounting share a symbiotic relationship where accounting provides the financial framework for supply chain activities, offering insights into costs, profitability, and resource allocation. Conversely, SCM influences accounting by shaping financial reporting through its impact on inventory valuation, cost management, and overall operational efficiency. This study mainly focuses on identifying the challenges and barriers to implementing SCM faced by retailers in the COVID-19 situation in Sri Lanka and how the industry mitigated those challenges and barriers. The concept of SCM is an unsurpassed way to visualise key drivers of all commercial entities as they perform to create value for their stakeholders. Almost all the managers in the business process work towards value creation for their organisation. They initiate technical or creative strategies within the organisation's operation using internal and external resources.

COVID-19 was an unexpected incident to the world, and people still suffer from the effects of this pandemic. People and business entities were affected adversely and faced many complexities. COVID-19 has especially impacted the retail industry across the world because of the lack of product availability and difficulties in distributing consumer goods to customers due to lockdowns in cities.

The problem statement of this study is, what are the challenges and barriers to implementing SCM in the retail sector, especially considering the COVID-19 situation. The supply chain is a composition of upstream and downstream supply-chain partners. While upstream means material inputs needed for manufacturing, downstream means operational-level work and distribution of the product. The organisation has the capacity to exert a degree of control over the aforementioned supply chain partners. However, there are uncontrollable factors like macro factors that influence the organization's supply chain such as political and legal, technological, economic, environmental, and social factors. The most recent relatable example is the COVID-19 pandemic. Most of the retailers failed to provide the products on time, and they failed to satisfy consumer needs and wants. This was mainly caused by the worldwide curfew and airport closures imposed by the governmental authorities to implement COVID-19 precautionary actions. At the same time, upstream material suppliers involved in the supply chain failed to provide the raw materials/manufactured goods to mass-scale retailers as expected due to difficulties they faced in the COVID-19 pandemic.

Shareholder wealth maximisation is the ultimate objective of most of the business entities. Identifying the challenges and barriers to implementing SCM will help achieve shareholders' ultimate target. Customer satisfaction is also essential to cope with the organization's demand forecasting and product availability while retaining a loyal customer base will generate repeat sales for the business. Another threatening barrier to the supply chain is outsourcing and offshoring the upstream and downstream activities of the supply chain. After removing non-value-adding activities, managers will focus primarily on core competencies. Then, threshold activities will be outsourced to a third party. It will save time and cost at the same time while saving management time to consider more strategic planning.

Based on the above-discussed problem statement, the research objectives of this study can be defined as follows:

1. To identify the challenges and barriers to implementing SCM within the retail industry in Sri Lanka;
2. To identify the relationship between factors affecting the challenges and barriers to implementing SCM in the retail industry in Sri Lanka;
3. To identify the mitigating strategies of challenges and barriers to implementing SCM under disaster situations.

At first, this study focuses on identifying challenges and barriers to implementing SCM within the retail industry in Sri Lanka using a structured questionnaire. Secondly, it aims to identify the relationship between factors affecting the SCM and the challenges and barriers to implementing SCM in the retail industry. Statistical calculations, assumptions, and analyses using existing literature give a more realistic viewpoint of the selected research topic. The final objective of this research is to identify the mitigating strategies of challenges and barriers to implementing SCM under disaster situations. To fulfil that objective, the researcher used recommendations made by research participants and got the support of empirical research literature to fill the existing research gap.

2 LITERATURE REVIEW

This section delves into the existing literature pertinent to the topic of investigation in the research study.

2.1 Distribution Process and Data Accuracy

The distribution process of a supply chain depends on the infrastructure of information-sensitive functions such as financing, logistics, and product development, as the synchronisation of the parts depends on the timing and accuracy of data. Acquisition of data such as demand/supply fluctuations, process delays, and bottlenecks and the distribution of such data to the relevant parties at the right timing determines half of the success. The competency of the said parties to execute strategies and functions appropriately determines the other half of a successful supply chain (Kuei et al. 2002).

2.2 Product Quality

Product quality is highly correlated with customer focus, employee empowerment, supplier quality management, supplier performance, and internal information system infrastructure, and therefore, quality management strategies must be centred on customer focus, supplier quality, and human resource management. Customer focus contributes towards customer retention and brand equity, while employee empowerment contributes towards higher product and service efficiency. Supplier quality management ensures compliance with industry/regulatory/internal standards while maintaining delivery consistency. The performance of suppliers contributes towards increased efficiency, higher margins, and long-term supplier relationships. Information system infrastructure ensures the smooth execution of the supply chain functions (Flynn et al. 1995).

2.3 Integration of Information Systems

Integration of information technology (IT) could improve quality and productivity through process enablers, process integrators, and process performance monitoring and analysis through information flow (Power 2005). However, the success factor remains in the deployment level of the technical solutions rather than the overall perceived quality. The

crucial elements in deploying a successful information system function are user focus, management support, and product design. However, IT solutions can only contribute to success with a composite and flexible integration. Nevertheless, IT is crucial in ensuring total quality management (TQM) within the supply chain.

2.4 Quality Relationships Affecting Supply Chain Quality

Supply chain quality is determined by the quality relationships between strategy, scope, performance appraisal, establishment and management of culture, human capital and organizational infrastructure, process synchronisation, and continuous improvement (Goetsch & Davis 2014). The strategy lays down the direction and requirements of the supply chain while the scope cascades down to describe each role attached to the supply chain. Performance appraisals ensure the continuous development of human capital while the culture sustains its quality. Organizational infrastructure ensures that the entire chain is functioning without bottlenecks. Furthermore, constant evaluation and involvement of suppliers and decentralised purchasing are crucial in guaranteeing smooth SCM.

2.5 The Efficiency Reaction

The supply chain must be trained to respond to efficiency fluctuations (Carmignani 2009). This scale must be based on product characteristics, market features, and production life cycle. Customer demand analysis, information and sharing, inventory management, and logistics are the four main processes in applying SCM systems (Carmignani 2009). Given that these are interconnected functions running simultaneously, it is prudent to design the SCM's quality management system in the form of a network or matrix with centralised shared services such as finance, human resources, and IT while delegating resource allocation power to individual business/process units positioned throughout the supply network. Members of a supply chain are integrated through many functions. Therefore, while long-term stable relationships are anticipated, it is only sometimes the case due to constant conflict of interest and process inefficiencies. Conversely, the potential for value creation can be established through more than stable SCM. The academic consensus is that the management's ability to detect and respond to change and risk. The implication is that the management should be able to acquire, allocate, and manage resources alongside changing and emergent strategies while managing capital to create value through every obstacle. Effective involvement of top management is key to successfully implementing a SCM system. Managers need to demonstrate effective leadership practices to create awareness of SCM (Yusuf et al. 2007).

2.6 Retail Supply Chain Management

Two critical observations of recent academic writing featuring retail SCM were a) successful retailers did not hold more than one-third of the inventory and b) successful supply chains deploy quick response strategies and lean initiatives, time-based competition, and other techniques such as postponement (Maqueira et al. 2020). Many other scholars identified that supply chain risk management is a crucial function as they inform the supply chain beforehand of the anticipated changes and appropriate responses. This ensures that people are less affected by the impact of risky events and, therefore, reduces the resistance level to change, eliminating inefficiencies through waste (Randall et al. 2011).

2.7 Supply Chain Risks Posed by COVID-19

The COVID-19 pandemic is a worse-case-scenario example of disruption risks. The core functions of a retail entity encompass product procurement, inventory management, sales, and customer service, creating a seamless shopping experience for consumers. The immediate outcomes of COVID-19 such as regional curfews, lockdowns worldwide, and port closures, disrupted the above-mentioned functions because employees could not come to work, and suppliers could not deliver goods on time. Massive losses required the company to shut down certain functions, impacting profitability and functionality. Goods were not delivered on time or at all due to curfews and port closures. However, the pandemic made it clear that government policies and systems must align with those of the domestic industries, especially in heavily supporting logistics-reliant industries (Esper 2020).

Technological advancement within industries had to take a massive leap with the emergence of COVID-19. Since travelling was impossible for most people, online connectivity enabled many organisations to function as usual. While this was implemented in many isolated silos of supply chains, the overall functionality was impossible for the retail sector. During the pandemic, suppliers could not continue production as the main workforce had to utilize in-house equipment and finished goods were isolated in warehouses. Therefore, the functionality of retail supply chains was crippled. However, the current state of the industrial world was brought about by systematic change through disruption events such as COVID-19. Innovation has always been the key in the face of unsolvable issues. While innovation can propel an existing supply chain forward, particularly in the retail sector, companies must proactively adapt their supply chain to align with the evolving "new normal" (Odunayo & Victor 2020). Sectors of production and assembly processes are already being embedded with robotics worldwide. If innovation and technology are to continue in its current space, the core functions of a retail chain can be remotely executed through robotics.

The COVID-19 pandemic has been a devastating factor in many ways. It has impacted not only people's day-to-day routine but all aspects of a person's life. The impact on supermarkets was massive. Food distribution and exporting were all discontinued due to this sudden pandemic. The transportation methods were blocked, the local food chains were broken down, and all the distributors could not engage in the normal daily practice of supplying food. Supermarkets launched new ways of delivering food to the village by village using various transportation methods. John Keells acknowledges that a significant challenge they confronted was the absence of a robust online platform for processing orders; before the pandemic, they averaged more than 2,000 orders per month, but this surged to over 10,000 orders monthly during the pandemic (economynext 2020). The other issue was delivering those orders to customers on time with no mistakes. They made various mistakes in the beginning, but those were decreased over time. The food supply was also significantly impacted during the pandemic and enormously impacted the restricted time, especially since food prices have increased rapidly (Thibbotuwawa 2020). Another major issue was the need for more labour during the lockdown period. Mostly in Western provinces, supermarkets daily serve more than 100,000 customers. Due to the sudden lockdown, the workforce could not engage with their daily work as practised earlier. This incident forced supervisors to do more planning about the options they could implement practically in the future. Furthermore, they faced health and safety issues for their workers and customers due to COVID-19 (Hamza 2020).

3 RESEARCH DESIGN AND METHODS

The focal point of this section is to elaborate on the research design and methods used in the research study. Firstly, the discussion was based on a chosen approach to conduct the research and the reason to select that approach for the analysis. Secondly, it discussed the established population, sample size, and selection of the sample. Next, a conceptual diagram was exemplified, and a hypothesis was developed. Then, the operationalisation of the research study was elucidated and finally, the sources used to collect the data, and data analysis strategies were clarified and vindicated.

3.1 Research Approach

This research study was based on a quantitative methodology to reach the objectives of this study.

3.2 Population and Study Sample

The population comprises all private and government retail supermarket chains (i.e., Keells, Cargills, Glomark, Arpico Super Center, Lanka Sathosa, Laugfs Super) operating in Sri Lanka (Figure 1). The retail shops, which can be classified as individual and smaller-scale businesses, were excluded from the population due to the practical challenges of gathering information. The sampling technique applied for the study is stratified random sampling. The sample of the study comprises 52 individuals (out of 208 individuals directly engaged with supply chain activities) from Keells, Cargills, Glomark, Arpico Super Center, Lanka Sathosa and Laugfs Super.

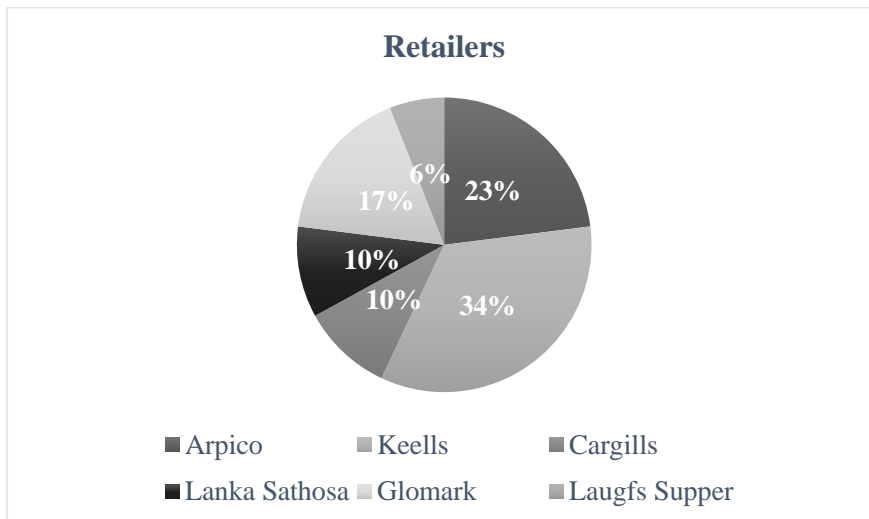


Figure 1: Sample Composition

Source: Author Constructed

3.3 Conceptual Diagram

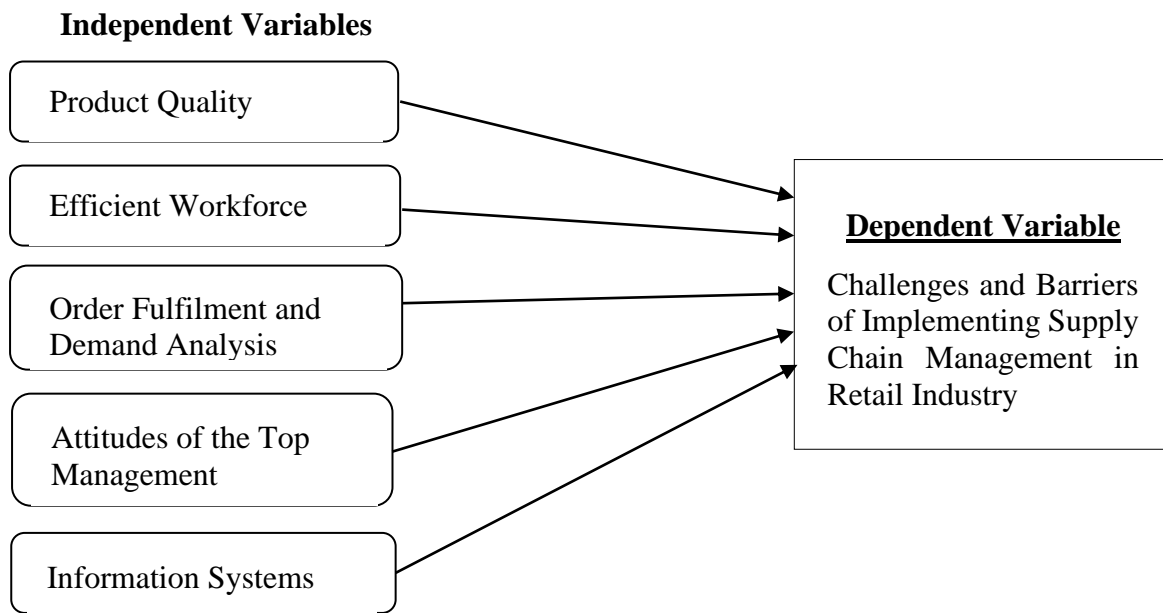


Figure 2: Conceptual Framework

Source: Author Constructed

Figure 2 embodies the inclusive research framework based on the literature review, which incorporates the association between the factors on challenges and barriers faced by the retail industry in Sri Lanka in implementing SCM and the relevant mitigating strategies. The effect of some controllable along with uncontrollable internal and external factors serves as independent variables.

3.4 Hypothesis

The below hypotheses (Table 1) were developed based on the conceptual framework presented in Figure 2.

Table 1: Hypotheses

Hypotheses	
H ₁	H _{1a} - There is no significant association between product quality and challenges and barriers to implementing SCM.
	H _{1b} - There is a significant association between product quality and challenges and barriers to implementing SCM.
H ₂	H _{2a} - There is no significant association between an efficient workforce and challenges and barriers to implementing SCM.
	H _{2b} - There is a significant association between an efficient workforce and challenges and barriers to implementing SCM.
H ₃	H _{3a} - There is no significant association between order fulfilment demand analysis and challenges and barriers to implementing SCM.
	H _{3b} - There is a significant association between order fulfilment demand analysis and challenges and barriers to implementing SCM.
H ₄	H _{4a} - There is no significant association between the attitudes of the top management and the challenges and barriers to implementing SCM.
	H _{4b} - There is a significant association between the attitudes of the top management and the challenges and barriers to implementing SCM.

H ₅	H _{5a} - There is no significant association between information systems and challenges and barriers to implementing SCM.
	H _{5b} - There is a significant association between information systems and challenges and barriers to implementing SCM.

Source: Author Constructed

3.5 Operationalisation

Independent and dependent variables of the conceptual framework are defined in Table 2.

Table 2: Operationalisation

Variable Denotation	Variable Name	Definition	Measurement	Type of Data
IEF_{it} – Internal & External Factor Variables				
<i>PQ_{it}</i>	Product Quality	No. of complaints generated for product quality-related matters for the firm.	Likert Scale	Interval
<i>EW_{it}</i>	Efficient Workforce	No. of employees working for supply chain function and culture of workforce for the firm.	Likert Scale	Interval
<i>OF_{it}</i>	Order Fulfilment and Demand Analysis	No. of customer inquiries for supply chain-related matters for the firm.	Likert Scale	Interval
<i>ATM_{it}</i>	Attitudes of the Top Management	No. of negative responses reading SCM from top management for the firm.	Likert Scale	Interval
<i>IS_{it}</i>	Information Systems	No interruptions happen due to Information systems failures in the supply chain function for the firm.	Likert Scale	Interval
Dependent Variable				
<i>SCM_{it}</i>	Challenges and Barriers to Implementing SCM in the Retail Industry	To identify the relationship between factors affecting the SCM and challenges and barriers to implementing SCM in the retail industry.	Likert Scale	Interval

Source: Author Constructed

3.6 Sources and Collection of Data

The principle data source was generated through questionnaires filled by 52 individuals (out of 208 individuals directly engaged with supply chain activities) from Keells, Cargills, Glomark, Arpico Super Center, Lanka Sathosa and Laugfs Super to understand the entire supply chain operation. Furthermore, the direct observation method is to be used to collect data to monitor the behaviour of different retailers.

3.7 Data Analysis Strategy

This segment depicts the proposed statistical techniques that were used to analyse the collected data from the questionnaire. The internal and external independent factors that create challenges and barriers to SCM and the factors affecting SCM will be analysed through

descriptive statistics. In addition, multiple linear regression was used to identify the highly correlated challenges and barriers to implementing SCM in the retail industry.

4 ANALYSIS AND DISCUSSION

Data analysis is a systematic process of observing data on a particular phenomenon using interviews and questionnaires. In this study, data was collected through a questionnaire distributed among 52 individuals (out of 208 individuals directly engaged with supply chain activities) from Keells, Cargills, Glomark, Arpico Super Center, Lanka Sathosa and Laugfs Super.

4.1 Data Representation

The questionnaire for data collection was distributed among 52 individuals directly engaged with the supply chain network of six selected supermarkets operating within Sri Lanka.

4.2 Descriptive Statistics of Demographics

The descriptive statistics of demographics analyse five different demographic factors: availability of SCM division, respondents' industry analysis, gender, age, and position.

4.2.1 Availability of separate supply chain division

According to Figure 3, all the respondents indicated that all six selected supermarket retailers have separate supply chain divisions.

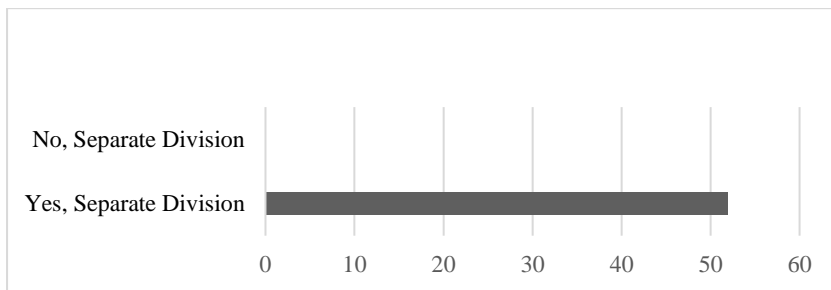


Figure 3: Supply Chain Division Analysis

Source: Author Constructed

4.2.2 Analysis of respondents' industry

As per Figure 4, all the participants in the sample indicated that they purely belong to the retail industry. It proved that the researchers had targeted the correct target sample for the research study's objective achievement.

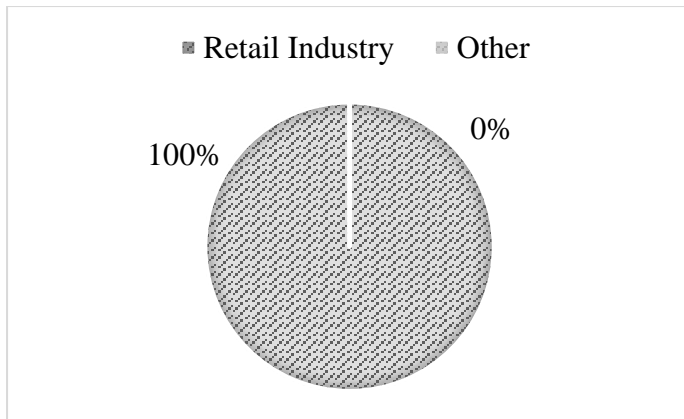


Figure 4: Industry Analysis

Source: Author Constructed

4.2.3 Gender of the respondents

Figure 5 indicates that most participants are female (63.5%). The male participants consisted of 36.5%. This indicated that many participants are female and directly attached to the supply chain activities of selected six supermarkets.

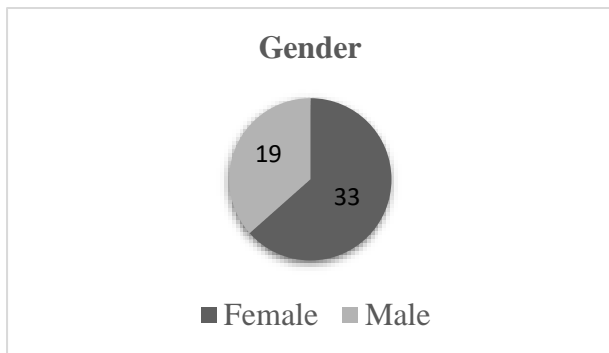


Figure 5: Gender Analysis

Source: Author Constructed

4.2.4 Age group

According to Figure 6, the analysis of the age of the participants indicated that many participants belong to the 21-30 age category (84%). 41-50 and 31-40 age categories represented 8% and 6%, respectively. The 18-25 age category represented 4%, and the least participated category was above 50, indicating 2% of total participants. According to the age group analysis, the conclusion was made that many participants are young employees.

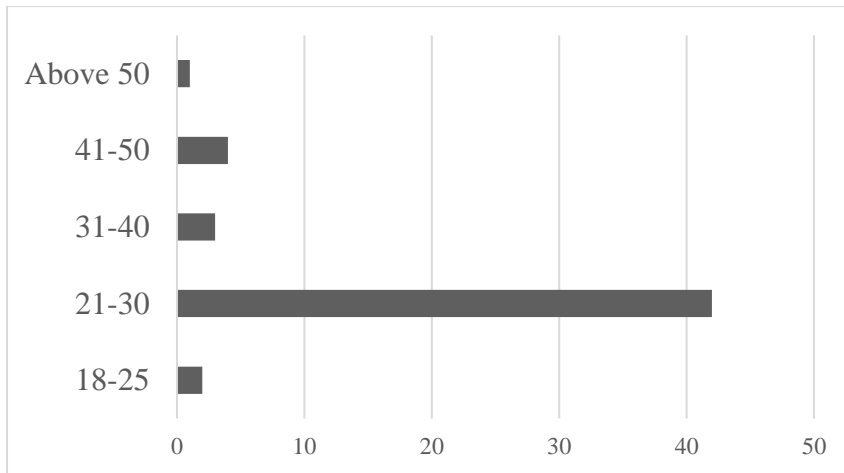


Figure 5: Age Analysis

Source: Author Constructed

4.2.5 Position of the Employee

According to Table 3 and Figure 7, an analysis of participants' employee positions, Assistant managers and Executive level employees represent the highest level of participation, and it is 37% each. Intern/Trainee represented 13%, and Manager/Department Head represented 4%. Only 2% represent the 'other' categories of employment positions.

Table 3: Employee Position Analysis

Category	Frequency	Percentage
Assistant Manager	19	37%
Executive	19	37%
Head of Department	2	4%
Intern/Trainee	7	13%
Manager/Department Head	4	8%
Other	1	2%
Total	52	100

Source: Author Constructed

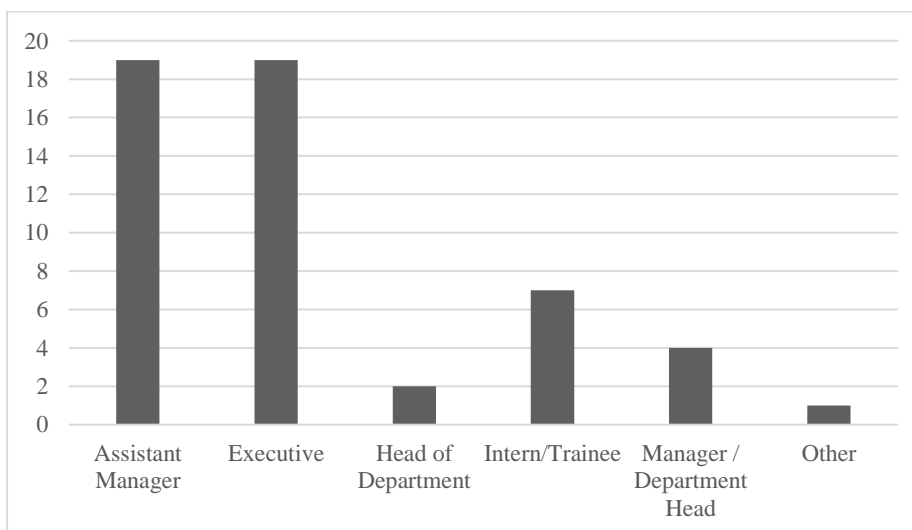


Figure 6: Employee Positions

Source: Author Constructed

4.3 Descriptive Statistics

Table 4: Descriptive Statistics for Dependent, Independent Variables

Variables	N	Min.	Max.	Mean	Median	SD	Skewness	Kurtosis
<i>SCM_{it}</i>	52	2.8	5	4.14	4	0.08	-0.23	-0.40
<i>PQ_{it}</i>	52	2.8	5	4.14	4	0.08	-0.30	-0.30
<i>EW_{it}</i>	52	2.4	5	4.17	4	0.09	-0.45	-0.45
<i>OF_{it}</i>	52	2	5	4.04	4	0.09	-0.57	-0.57
<i>ATM_{it}</i>	52	2.6	5	4.07	4	0.09	-0.70	-0.70
<i>IS_{it}</i>	52	2.6	5	4.08	4	0.09	-0.72	-0.72

Source: Author Constructed

The researcher used a Likert-type questionnaire to collect data for the research study. According to Table 4, the mean and standard deviation analysis, the mean value indicated a value between 1-5. Research data analysis provide that participants moderately agree that the above-selected factors, namely product quality (*PQ_{it}*), efficient workforce (*EW_{it}*), order fulfillment and demand analysis (*OF_{it}*), attitudes of the top management (*ATM_{it}*), and information systems (*IS_{it}*), affect the challenges and barriers of implementing SCM (*SCM_{it}*). The standard deviation values are less than one, indicating that values are not highly dispersed from the mean values.

4.4 Validity and Reliability

4.4.1 Validity

Validity refers to how explicitly apply both strategies and structure for exploration. A systematic approach was undertaken to ensure the validity of the survey instruments. Expert consultation and an extensive literature review were conducted to ascertain that the survey questions effectively captured the pivotal dimensions of SCM challenges and barriers. Subsequently, pilot testing with a representative subset of respondents was conducted to detect and rectify any potential ambiguities or concerns associated with the survey questions. Furthermore, construct validity was assessed, scrutinizing the alignment of survey items with established SCM theories and concepts, coupled with factor analysis. These meticulous measures collectively bolstered the validity of the survey instruments, thereby guaranteeing precise measurement of SCM challenges and barriers within the Sri Lankan retail sector.

4.4.2 Reliability

In psychological research studies, reliability is considered as consistency of research study. The researcher has conducted a pilot test to measure the reliability level of the questionnaire developed for the data collection (Tavakol & Dennick 2011). Cronbach alpha was used to measure the reliability level of the questionnaire (Bonett & Wright 2014). To consider that the questionnaire is significant and reliable, it is required to achieve more than the Cronbach alpha test value of 0.8. According to Table 5, test results indicated that Cronbach alpha for all independent variables and dependent variable were more than 0.8. Therefore, it was concluded that the questionnaire is reliable.

Table 5: Reliability Measurement

Independent Variables	Cronbach's Alpha	No. of Items
PQ_{it}	.828	5
EW_{it}	.838	5
OF_{it}	.832	5
ATM_{it}	.824	5
IS_{it}	.818	5
Dependent Variable		
SCM_{it}	.824	5

Source: Author Constructed

4.5 Regression Analysis

Table 6: Regression Statistics

	Intercept	Coefficients	Std. Error	Sig. F	Lower 95%	Upper 95%	Multiple R	R ²
PQ_{it}	0.08	0.9806	0.0382	0.0000	0.9627	0.9984	0.9980	0.9959
EW_{it}	1.47	0.6399	0.4244	0.0000	0.4568	0.8229	0.7046	0.4964
OF_{it}	1.22	0.7225	0.3789	0.0000	0.5544	0.8905	0.7736	0.5985
ATM_{it}	1.00	0.7713	0.3434	0.0000	0.6176	0.9249	0.8187	0.6703
IS_{it}	0.97	0.7774	0.3473	0.0000	0.6199	0.9349	0.8141	0.6627

Source: Author Constructed

4.5.1 Product quality

According to Table 6, the coefficient value between product quality (PQ_{it}), and challenges, and barriers to implementing SCM (SCM_{it}) is 0.980, and thus indicates a highly positive relationship between product quality (PQ_{it}) and the challenges and barriers of implementing SCM (SCM_{it}). The F value of the test was indicated as 0.00 ($p < 0.05$) and it indicates that there is a highly positive relationship between product quality (PQ_{it}) and challenges and barriers to implementing SCM (SCM_{it}). Accordingly, the hypotheses developed for the research study were accepted as there is a significant association between product quality (PQ_{it}) and challenges and barriers to implementing SCM (SCM_{it}) by rejecting the null hypothesis developed for the research study.

The regression analysis indicates the relationship strength between dependent and independent variables (Yoshikane et al. 2013). As per the regression statistics, the multiple R value of the test is 0.99, proving a strong positive relationship between product quality (PQ_{it}) and challenges and barriers to implementing SCM (SCM_{it}). As per the analysis, the test's R² value is 0.9959, which indicates that 99% of challenges and barriers to implementing SCM (SCM_{it}) depend on product quality (PQ_{it}). The adjusted R² of 0.9958 which is less than the test's R value, proved the regression's goodness of fit.

4.5.2 Efficient workforce

The correlation value between an efficient workforce (EW_{it}) and the challenges and barriers to implementing SCM (SCM_{it}) is 0.639. Thus, it is noted that there is a positive relationship

between an efficient workforce (EW_{it}) and the challenges and barriers of implementing SCM (SCM_{it}). The F value of the test was indicated as 0.00 ($p < 0.05$). Therefore, it proved a highly positive relationship between an efficient workforce (EW_{it}) and challenges and barriers to implementing SCM (SCM_{it}). Based on the results, the alternative hypothesis was accepted as there is a significant association between an efficient workforce (EW_{it}) and challenges and barriers to implementing SCM (SCM_{it}).

According to regression analysis, the multiple R value of the test is 0.704, indicating a strong positive relationship between an efficient workforce (EW_{it}) and the challenges and barriers to implementing SCM (SCM_{it}). According to the test results of R^2 0.4964, 49% of challenges and barriers to implementing SCM (SCM_{it}) depend on the efficient workforce (EW_{it}). The adjusted R^2 value of 0.4863 proved the goodness of fit for the regression.

4.5.3 Order fulfilment and demand analysis

The correlation results indicated a 0.722 test value between order fulfilment and demand analysis (OF_{it}) and the challenges and barriers of implementing SCM (SCM_{it}). Therefore, a positive relationship between order fulfilment and demand analysis (OF_{it}) and the challenges and barriers of implementing SCM (SCM_{it}) is observed. The F value of 0.00 ($p < 0.05$) proved a highly positive relationship between order fulfilment and demand analysis (OF_{it}) and the challenges and barriers of implementing SCM (SCM_{it}) at a significant level. Accordingly, the null hypothesis was rejected, and the alternative hypothesis was accepted as there is a significant association between order fulfilment and demand analysis (OF_{it}) and challenges and barriers to implementing SCM (SCM_{it}).

The multiple R values of 0.773 indicated a strong positive relationship between order fulfilment and demand analysis (OF_{it}) and the challenges and barriers of implementing SCM (SCM_{it}). The R^2 of 0.598 indicated that 59% of challenges and barriers to implementing SCM (SCM_{it}) depend on order fulfilment and demand analysis (OF_{it}). The adjusted R^2 value of 0.590 proved the goodness of fit for the regression.

4.5.4 Attitudes of the top management

The correlation results indicated a value of 0.771 between the attitudes of the top management (ATM_{it}) and the challenges and barriers to implementing SCM (SCM_{it}). Accordingly, a perfect positive relationship between the attitudes of the top management (ATM_{it}) and the challenges and barriers of implementing SCM (SCM_{it}) is noted. F value is indicated as 0.00 ($p < 0.05$) and therefore, it indicated a highly positive relationship between the attitudes of the top management (ATM_{it}) and the challenges and barriers to implementing SCM (SCM_{it}). Therefore, it agreed and accepted the alternative hypothesis as there is a significant association between the attitudes of the top management (ATM_{it}) and the challenges and barriers of implementing SCM (SCM_{it}) by rejecting the null hypothesis.

A multiple R value of 0.818 indicated a strong positive relationship between the attitudes of the top management (ATM_{it}) and the challenges and barriers of implementing SCM (SCM_{it}). The R^2 value of 0.670 indicated that 67% of challenges and barriers to implementing SCM (SCM_{it}) depend on the attitudes of the top management (ATM_{it}).

4.5.5 Information systems

According to the analysis results, there is a correlation value of 0.777 between information systems (IS_{it}) and challenges and barriers to implementing SCM (SCM_{it}). Therefore, a highly positive relationship between them are noted. The F value is indicated as 0.00, ($p < 0.05$) and it indicates a highly positive relationship between information systems (IS_{it}) and challenges and barriers to implementing SCM (SCM_{it}). According to the results, the alternative hypothesis was accepted as there is a significant association between information systems (IS_{it}) and challenges and barriers to implementing SCM (SCM_{it}).

Since the multiple R value of the test is 0.814, it indicates a strong positive relationship between information systems (IS_{it}) and the challenges and barriers of implementing SCM (SCM_{it}). According to the test results of R^2 value 0.662, 66% of challenges and barriers to implementing SCM (SCM_{it}) depend on the information systems (IS_{it}).

4.6 Discussion

This section discussed the key findings of the research study and its consistency and compatibility with research literature findings.

Product quality is the first challenging factor of implementing SCM, faced by the retail industry in Sri Lanka. According to the research data analysis, it indicated that there is a highly positive relationship between product quality and challenges and barriers to implementing SCM. It agreed with the prior research literature that product quality is highly correlated with customer focus, employee empowerment, supplier quality management, supplier performance, and internal information system infrastructure; therefore, quality management strategies must be centred on customer focus, supplier quality, and human resource management.

The second challenge and barrier to implementing SCM is the efficient workforce. According to the research data, a highly positive relationship exists between an efficient workforce and challenges and barriers to implementing SCM. It proved the research literature (Hussain et al. 2018) that employee motivation is critical to ensuring that the workforce, which is the core value creation unit, is empowered to improve continuously to beat the competition while continuing to innovate and regroup through uncontrollable events to survive.

The third challenging factor is order fulfilment and demand analysis, which impacts the implementation of effective SCM. The research data analysis results indicated that there is a highly positive relationship between order fulfilment and demand analysis and challenges and barriers to implementing SCM while agreeing with the research literature findings (Goetsch & Davis 2014), supply chain quality is determined by the quality relationships between strategy, scope, performance appraisal, establishment and management of culture, human capital and organizational infrastructure, process synchronization and continuous improvement.

The attitudes of the top management are the fourth factor of challenges and barriers to implementing SCM. The research data analysis results indicated a perfect positive relationship between the attitudes of the top management and the challenges and barriers to implementing SCM. The research findings proved the existing research literature of (Croom et al. 2000) on the effective involvement of top management to implement a SCM system successfully. Managers must demonstrate effective leadership practices to create awareness of SCM.

Information systems are also considered as a barrier and challenge to implementing SCM. The research data findings proved a highly positive relationship between the integration of IT. The findings of the research agreed with the research literature findings (Power 2005) that the integration of IT could improve quality and productivity through process enablers, process integrators, and process performance monitoring and analysis through information flows.

5 CONCLUSION

In the modern world, many organisations experience that they need to implement smooth SCM systems to improve their operations. Therefore, in the current environment of the Sri Lankan retail industry, almost all companies are attempting to make the best supply chain function for their businesses. Smoothly operating supply chain systems will manage business functions, including marketing and sales, stock handling, manufacturing, infrastructure facilities, procurement, human resources, information technology, etc. SCM systems can perform various organizational tasks by combining various aspects of the organisation. The objective of this research study is to identify the impact of factors on the challenges and barriers to implementing SCM within the retail industry in Sri Lanka and mitigating strategies. For that, existing literature was evaluated, and a questionnaire was distributed among 52 individuals who are directly engaged with the supply chain network of six selected retail supermarkets and five different hypotheses were developed and measured using Likert scale questions. Based on the hypotheses test, it indicated that all the five selected independent variables, namely product quality, efficient workforce, order fulfilment and demand analysis, attitudes of the top management, and information systems, indicated a positive relationship with challenges and barriers to implementing SCM. Table 7 summarizes the results of the hypotheses tests.

Table 7: Results of Testing Hypotheses

Hypotheses	Results
H _{1b} - There is a significant association between product quality and challenges and barriers to implementing SCM	Significance F 0.0000 ($p < 0.05$) H _{1b} -Accepted
H _{2b} - There is a significant association between an efficient workforce and the challenges and barriers to implementing SCM	Significance F 0.0000 ($p < 0.05$) H _{2b} -Accepted
H _{3b} - There is a significant association between order fulfilment and demand analysis and challenges and barriers to implementing SCM	Significance F 0.0000 ($p < 0.05$) H _{3b} -Accepted
H _{4b} - There is a significant association between the attitudes of the top management and the challenges and barriers to implementing SCM	Significance F 0.0000 ($p < 0.05$) H _{4b} -Accepted
H _{5b} - There is a significant association between information systems and challenges and barriers to implementing SCM	Significance F 0.0000 ($p < 0.05$) H _{5b} -Accepted

Source: Author Constructed

Therefore, it is imperative to comprehend the effect of executing smooth SCM systems by removing challenges and barriers to implementing SCM in an organisation.

The following implications are noted based on the above findings of this study.

Creation of a comprehensive emergency operations centre (EOC)

Today, most organisations consider establishing emergency operations centres (EOC) to mitigate supply chain risk. These EOCs tend to exist within the corporate business units, and retail supermarkets will benefit from comprehensive EOCs. It is required to create a detailed structure for centres to exist at the panel level along with pre-determined action plans for coordination, communication, protocols for decision-making, and communications. The emergency action plans required the involvement of both customers and suppliers to implement an effective and comprehensive EOC.

Increase welfare facilities for employees

Facilitation of employee welfare is paramount since employees are a critical resource base for organisational continuation. It is required to rethink work practices to maintain a continuous supply chain during pandemic situations like COVID-19. At the time of Hurricane Katrina in 2005, Procter & Gamble thought about employees and created a local employee village with housing, and foodstuff, and provided cash advances for employees and their families (Harvard Business Review 2020). Therefore, encouraging work-from-home facilities to employees who can adopt it based on their nature of work and concentrate on employee hygiene and welfare leads to implementing effective and efficient SCM within the retail industry of Sri Lanka, irrespective of the pandemic condition.

Adoption of innovative technology

To mitigate disruptions to the supply chain in the long run, disruptive technologies like big data analytics, blockchain, and additive manufacturing are required. Adopting disruptive technologies helps companies to create an optimal mix of dedication and flexible manufacturing facilities to make regular items in bulk and supply specialised items immediately to respond quickly against uncertain demand (Mondol 2021).

Redesign supply chain with second sources

Redesigning the supply chain network helps companies to create a backup facility for the supply of goods and outage of distributions. The creation of backup facilities aids the spread of the risk of disruptions. Further, keeping the backup facility outside the primary sourcing region is advisable to create more security for effective SCM (De Vass et al. 2020).

In terms of future research directions, this research was conducted only based on six selected retail supermarkets operating separate SCM systems, and it does not consider the entire retail market of Sri Lanka; and thus, future researchers can continue their research covering all the supermarkets and retail stores in Sri Lanka to give a broader perspective to the research study. Further, this research study narrowed down to challenges and barriers of implementing SCM faced by the retail industry in Sri Lanka amidst the COVID-19 situation. Future research can expand the research towards minimizing challenges and barriers to implementing SCM by covering other industries. This research study only considered five variables that affect challenges and barriers to implementing SCM within the retail industry of Sri Lanka. Future research can expand the research by expanding the variables that affect challenges and barriers to implementing SCM within the retail industry of Sri Lanka.

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