



IMPACT OF SUPPLY CHAIN LINKAGES ON NON-FINANCIAL PERFORMANCE OF COMPANIES WITHIN BIYAGAMA BOI ZONE

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Abstract

The supply chain was the vital function that has hugely affected the COVID 19 outbreak worldwide and is a massive blow to the entire supply delivery system. The corporate world is seriously discussing the way forward to find the remedies that have to be more sustainable. Hence, this study examines the impact of the supply chain linkages with Non- Financial Performance in Sri Lanka. Quality of Production, Delivery on Time, and Customer Relations are the significant supply chain linkages in the process taken as independent variables to detect the impact on Non-financial Performance. The data were collected via a self-developed structured questionnaire which was issued to 180 respondents. However, only 120 effective responses were received from managerial level employees working in the Biyagama BOI zone. Subsequently, the collected data were put over for further analysis to test the reliability and validity. Then correlation and multiple regression analysis were carried out. The results revealed a significant positive relationship between Quality of Production and on-time delivery with Non-financial Performance. Meanwhile, a highly positive relationship was found between On-time Delivery and Non-financial Performance. Hence, it was concluded that Production Quality, on-time delivery, and Customer relations significantly impacted the Non-financial Performance of the companies located within the Biyagama Board of Investment (BOI) Zone. Benefits sought with the relationship within the supply chain must be considered in developing the operational and the Non-Financial performance. Ultimately, the Non-financial Performance is greatly influenced by the long-term and strategic relationship within the companies' supply chain partners and managerial employees. Future research might be evolved to measure the impact of supply chain linkages on financial and Non-financial Performance, bringing a comparative analysis between two aspects of performance.



Keywords: Customer relationship, non-financial Performance, On-time delivery, production quality, supply chain linkages

1.0 INTRODUCTION

Supply Chain Management (SCM) has become a core operation in many organizations around the world. The business's success is linked to integrating the supply chain network effectively to achieve sustainable competitive advantages (Tracey, Lim, & Vonderembse, 2005). Supply Chain Management (SCM) is described by the Council of Supply Chain Management Professionals as the "planning and management of all activities involved in sourcing and procurement, conversion, and all logistic activity control." It fundamentally manages all the channel activities between suppliers and customers and tries to ensure that the manufactured goods reach the customer (Xi & Canhua, 2008). It also integrates the supply and demand function evolving from a raw material supplier to finished goods sold to a customer (Vitasek, Ledyard & Mandrodt, 2010).

Due to global competition, the companies have begun to practice recent trends such as business process outsourcing. In recent years, substantial progress has been made in supply delivery networks to comfort linkages among companies in all industry segments (Trienekens, 2012). The complexity of supply chains has been evolving due to several interaction contacts ranging from primary raw material handling to finished product distribution to the target consumers. The complexity of supply chains has increased (Richard & Swink, 2012). Meanwhile, "Supply chain linkages" refer to an organization's implicit or explicit connections with its supply chain critical entities (Kyeremeh & Dza, 2018). It is vital in ensuring the flow of information from the firm to the customers while the firm manages the quality of the information as it flows (Rungtusanatham, Salvador & Forza, 2008).

Singh and Power (2009) state that the critical factor behind Supply Chain Management is to evolve a long-lasting relationship with its suppliers and key customers, who eventually are the key stakeholders to help the organization to generate profit. The fundamental purpose of the supply chain created for production is to control stocks by maintaining and managing material flow. Hence, material management plays a vital role in supply chain management, primarily reduction in raw material cost provides a critical turning point in generating unusual profit for the organization (Krajewski, 2013). Therefore, the primary motive of this study is to investigate the linkages of the supply chain process. Subsequently, it examines the impact of the organization's Non-financial Performance, which is the crucial difference from the rest of the other research from the past literature.



Therefore, well-defined supply chain improvement affects business performance because supply linkage is essential to efficiency and reliability (Lee, 2007). Meanwhile, Managers can look at the longer-term consequences of investment decisions and their short-term benefits and returns. When it is extended, these customers and suppliers can establish a greater connection with one another (Rungtusanatham et al., 2008). The solid long-term relationship with the stakeholders of the supply chain network reduces operating costs, network inefficiency, and demand volatility of the organization (Fawcett, Magnan & McCarter., 2008). Further, Gunasekaran, Patel, and Tirtiroglu (2001) found that the performance measurement is growing in its scope and importance to improve the supply chain effectiveness and efficiency. Although improvement in the supply chain can mitigate much of the supply-side constraints, demand volatility will be largely alleviated, leaving a notable impact on the organization's performance.

The ultimate objective of supply chain effectiveness is to reduce the cost in all possible processes, from raw material to finished goods. The majority of the organizations are intended to convert the benefit to the customers (Sabesan & Haleem, 2016). Four indicators can determine how a firm's supply chain performs (Chae, 2009). These indicators consist of planning, operation, delivery of products & services to customers, and post-delivery Performance (Singh, Soni, & Badhotiya, 2019). Nonetheless, each performance indicator consists of several interrelated factors which affect their respective performance in the supply chain process. However, this study is, therefore, picked up one variable from each key performance indicator (KPI), which determines supply chain performance. Accordingly, Quality of Production is from operational KPI, On Time-Delivery is from Delivery of Products & services KPI, and Customer Relationship from Post Delivery performance. As a result, this study explores the supply chain linkages among these identified variables that impact on Non-financial Performance of the organization. The study also examines the impact of these factors on the Non-financial Performance of companies located in the Biyagama BOI zone to satisfy the customer. Hence, this study will bring a novel contribution to the existing literature in Supply Chain Management and contributes to the practitioners such as companies that largely depend on the supply chain linkages for their growth.

2.0 PROBLEM STATEMENT

The critical overview of previous literature and the history of the study direct us that Non-Financial Performance creates negative and positive results according to the technology and social impacts (Banker, Potter, & Srinivasan, 2000). It is a contradictory question that has been arisen by reviewing and observing the previous findings; even though the manufacturing and logistics firms enjoy the same infrastructure facilities in the BOI zone, supply chain performance differs among them. It can be suspected that there are other different kinds of factors affecting Non-financial Performance other than infrastructure facilities. Therefore this study has the following research questions.



3.0 RESEARCH QUESTIONS

- Do Quality of Production, On-time delivery, and customer relationship have a significant association with Non-financial Performance?
- Whether supply chain linkages impact Non-financial Performance?

4.0 OBJECTIVES OF THE STUDY

- To identify the relationship between Production qualities, on-time delivery, and customer relationship with Non-financial Performance.
- To examine the impact of supply chain linkages on the Non-financial Performance of the companies.

5.0 LITERATURE REVIEW

5.1 Supply Chain

Oliver and Webber (1992) define Supply Chain Management (SCM) as the process of designing, executing, and dealing with the supply chain network to satisfy customers efficiently and effectively. Hence, SCM coordinates the flow of product from the beginning of design through manufacturing and into the customer's hands at the point of sale (Baltes, 2015). Materials flow, finance flow, and knowledge flow are all part of SCM; meanwhile, material flow and the information flows both upward and downward of the supply chain (Handfield, 2002). The considerations in the SCM include product design, installation, testing, management, and measurement. Reducing inventory, decreasing transaction time, and growing market flow is the paramount consideration of the SCM. It considers the final good or service stages are delivered to the customers or even after the delivery. It ensures the satisfaction of customers. Moreover, companies around the world are now believed that a vibrant supply chain management is the source of competitive advantage and significantly reduce the cost of production (Gunasekaran et al., 2001)

According to Raghunath & Devi (2018), the economic benefit of firms in the Business-to-Business market around the world is incorporated into a dynamic partnership network with vendors, consumers, and many other stakeholders (Hugos, v 2018). The most important objectives of SCM are cost rationalization through the costs in the functional area of operation, logistic and administrative overhead costs. (Okongwu, Brulhart, & Moncef, 2015) researched Casual linkages between SCM practices and performance by utilizing supplier partnership, information quality, customer relationship sharing as the independent variables. They suggested that besides those factors, many strategic paths link with SCM and other Financial performance-related assets.

5.2 Supply Chain linkages

The linkages of the supply chain denote the bonds between suppliers and customers that must be generated a unique and unexpressed relationship during the flow of quality raw materials to the production plant, and finished products are delivered to the right customers to build up a partnership level. The supply chain linkages demand a global wise competition to achieve



save the cost, sales, and operational planning and inventory management (Lee, 2007). Moreover, Rangtusanatham (2008) argued that firms had been conceptualized using a resource-based view to build a solid structure to define, justify, and forecast their relationships with supply chain linkages. The linkages in the Supply chain mainly consist of Quality of Production, Delivery of the goods on time, and Maintain Customer Relationship, which affects the organization's performance, are discussed as follows.

5.3 Production Quality

As customer needs and wants increase with the change of the time, the production quality has to be the perfect match to the customer's requirements, whether products produce distributes and sold. Comforting production quality contains three principal functions. Product quality defines as a combination of options that can meet customer needs and wants and deliver them satisfaction by increasing good and making them free from any inadequacies or defects (Edmund & Juran, 2008). Quality is the overall characteristics and functions of a particular product related to its compatibility to reach customer needs and wants. The quality of a particular product depends on several factors that are relatively difficult to rank.

5.4 On-Time Delivery

On-Time delivery is a measure of mechanism and an indicator of supply chain efficiency, which enhances the number of finished products delivered to customers' hands for final consumption. Moreover, it helps to identify the efficiency of the organization that can achieve customers' requirements. By any chance, if those figures are too low or below the expected benchmark, it could be used as a signal to the management that the supply chain of the company consists of few or more bottlenecks which cut down the efficiency. Also, it is considered as a warrant for further investigation of the problems to be solved. On-time delivery is a common metric used to assess a business's ability to fulfill shipping orders and other services within a certain period promised to the customer. This process enhances the organization's overall performance, if not affect the Non-financial Performance of the firms. The concept of On-time delivery is referred to as the delivery standard of orders, which blends delivery precision and order accuracy (Igwe & Robert, 2016).

5.5 Customer Relationship

Vavra (1992) defines CRM as the retention of a customer after the sales have taken place with the bond of taking them to stay in touch for a healthy long-term relationship to develop a customer lifetime value. On the other hand, Lado, Paulraj, and Chen (2011) found that Customer relationship is an integral part of developing the supply chain effectively. Further, Customer relationship is a list of steps and manner by which an organization develop establish and maintain the connection with the customers' business success and the unsuccessful is depend on the satisfaction of the customers accordingly organization must develop effective customer relationship on the practical world customer relationship effectively communicate with our customer and directly addressing complains and satisfied the as opportunities for

Improvement. In simple words, listen to the organization's customers. Customer relationship can be identified as the process and manner in which business develops and establishes an everlasting relationship with the customer, making them to the partner level in the ladder of Customer Relationship Management (CRM). The overall performance of the business varies with the support of their customers. Hence, it has obvious evidence that customer relationship impacts supply chain management.

5.6 Non-financial Performance

Financial performance only focuses on a single dimension and outcome-based, incomplete and insufficient to make essential decisions in firms (Okongwu. et al.,2015). On the other hand, Non-financial measures flow from the strategy where it covers forward-looking, explains financial outcomes, and more than everything is predictive (Matsoso & Benedict, 2014). By referencing past research and articles, most of them recognize non-financial performance in a social factor context (Zelbst, 2009). Nevertheless, this study has focused on dimensions that represent the operational factors of companies that develop the critical linkages of supply chain management, which impacts the non-financial performance of companies in the Biyagama BOI zone. Value addition to the services, elimination of late orders, Employee recognition, Brand recognition, and reduction of the operating cycle are the dimensions considered in the study.

Non-financial performance is a metric used to measure non-financial indicators, and usually, these metrics are qualitative (Haleem & Raisal, 2016). Meanwhile, the Supply chain effectiveness impacts the revenue and profit of the organization. Some of the basic financial measures that have a connection with supply chain management are the financial performance metrics, assets return (ROA), equity return (ROE), investment return (ROI), profit margin, earnings per share, per employee value. Changing nature of the environment and the global shift in advanced technology have created a new way of thinking. Companies started to use non-financial indicators as the performance measurement tool like consumer loyalty, customer engagement, employee satisfaction, and customer satisfaction in addition to traditional financial metrics, bringing the goals of these measurements into question. As for the benefits of non-financial performance benefits, most importantly, identify that firms that maintain a high level of non-financial performance tend to achieve more financial benefits in the future. Based on the draw out of the above critical literature review, It was formed the following conceptual model to go for further analysis as given in figure 1.

6.0 CONCEPTUAL FRAMEWORK

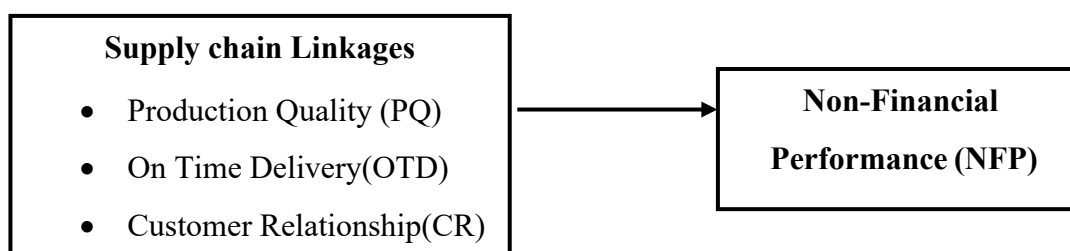


Figure 1: Conceptual framework



7.0 METHODOLOGY

According to the study, the questionnaire was used to collect the stipulated data from target respondents. This study's target population was Managerial employees working in the companies located within Biyagaa BOI Zone. The convenient sampling method was used to select the sample. Altogether there were 160 managerial employees taken as the sample of the study. Initially, the researcher gives the questionnaire to the employees who were randomly selected. However, due to the COVID-19 researcher finds it difficult to collect the responses. As a result, the questionnaire was again sent to employees as a google form, an online survey method.

According to this framework, non-financial performance depends on supply chain linkages as production quality, on-time delivery, customer relationship. Non-financial performance is labeled as the dependent variable. Therefore, production quality, on-time delivery, customer relationship is labeled as dimension to measure the Supply chain Linkages.

8.0 HYPOTHESES

Following research hypotheses were developed according to the conceptual framework.

- H1:** Production Quality has significantly related to the Non-financial Performance of companies located in the Biyagama BOI zone.
- H2:** On-time delivery is positively associated with the Non-financial Performance of companies located in the Biyagama BOI zone.
- H3:** Customer relationship significantly associated with Non-financial Performance of companies located in Biyagama BOI zone.
- H4:** Supply chain linkages significantly impact the Non-financial Performance of companies located in the Biyagama BOI zone.

9.0 ANALYSIS

The reliability and validity of data have been initially examined, and correlation analysis between dependent and independent variables has been carried out subsequently. The multiple regression analysis was then conducted to determine the significant impact of SCM on Non-financial results in the Biyagama BOI zone in Sri Lanka of listed companies. The result is revealed as below in Table 1.

Table -1: Result of Reliability analysis

Variables	Cronbach's alpha	Number of questions
Supply Chain linkages		
• Production Quality	0.625	4
• On-Time Delivery	0.640	9



• Customer Relations	0.709	10
• Nonfinancial Performance	0.571	6

(source; survey data, 2020)

Cronbach’s alpha measures the data's internal consistency, an essential element in the reliability test. Findings demonstrate that all the variables have a Cronbach alpha value greater than 0.5, suggesting that all parameters are appropriate for further analyses. The data were then tested for validity.

Table -2: KMO and Bartlett's test values

Variable	Kaiser-Meyer- Olkin Measure of sample Adequacy (KMO)	Sig
Production Quality	0.686	0.000
On Time Delivery	0.672	0.000
Customer Relations	0.560	0.000
Non-Financial Performance	0.558	0.000

(source survey data, 2020)

The result shows that the KMO measure of sample adequacy for the entire variables is greater than 0.5 at the relevant significant level. Moreover, KMO illustrates the value of all variables. Results of Bartlett’s test of the Sphericity indicate that all the factors are significant at 0.000. When considering the KMO values are more than 0.5. Thus, as a conclusion of this analysis, the composite validity was assured.

Table -3 result of correlation analysis.

Variable		NFP	PQ	OTD	CR
NFP	Pearson Correlation	1			
	Sig. (2-tailed)				
PQ	Pearson Correlation	.673**	1		
	Sig. (2-tailed)	.000			
OTD	Pearson Correlation	.670**	.688**	1	
	Sig. (2-tailed)	.000	.000		
CR	Pearson Correlation	.737**	.666**	.656**	1
	Sig. (2-tailed)	.000	.000	.000	

** Correlation is significant at the 0.01 level (2-tailed).

(Source survey data, 2020)

Based on the regression analysis, a significant positive association was found observed between Production Quality, On-Time delivery, Customer Relationships, and Non-financial Performance. As the correlation coefficient value show greater than 0.5 ($r = 0.673$, $r = 0.670$ and $r = 0.737$ respectively) and significant value was also found 0.000 which is less



than 0.05.

Result of Regression Analysis

Table -4: model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.792 ^a	0.643	0.631	0.405	1.744

(Source survey data, 2020)

The regression analysis model summary indicates the degree to which extent independent variables explain the dependent variable. It further elaborates that the R Square value takes around 0.643, which means 64.3% of the variation of Non-financial Performance is explained by supply chain linkages that consist of Quality of Production, Delivery On-time, and Customer Relationship. The remaining statistical results of the variability of 35.7% in non-financial performance are attributed to non-related variables that are not included in this study.

Table -5: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	34.001	4	8.500	51.779	.000 ^b
Residual	18.879	115	.164		
Total	52.881	120			

The variance analysis (ANOVA) test indicates a statistically significant regression model at a level of less than 0.000, which is below 0.05. Thus, it can be concluded that the model fit can be seen based on a regression model. Nonetheless, the below table illustrates that each exogenous

Table-6: Significant value of all variables

Model		Unstandardized		Standardized		t	Sig.
		Coefficients		Coefficients			
		B	Std. Error	Beta			
1	(Constant)	0.543	0.224			2.421	0.017
	PQ	0.191	0.073	0.224		2.634	0.010
	OTD	0.242	0.088	0.23		2.737	0.007
	CRM	0.469	0.088	0.437		5.352	0.000

The coefficient table of Regression analysis, which defines the beta value in terms of the magnitude of the effect that the dependent variable has on each independent variables can

have. All the variables have a p-value of less than 0,0005 in the model and are statistically significant for all independent variables. Thus, the following finalized model has therefore been established in conclusion.

$$NFP = 0.543 + 0.191PQ_t - 0.242OTD_t - 0.469CR_t$$

10. Hypothesis Testing

After analyzing the data, hypotheses were tested to make sure the assertion in the light of the data analyzed. The most common policy in statistical hypothesis testing is establishing a significance level, denoted by α , and reject H_0 when the p – value falls below significant level. Hypotheses were tested and explained one by one is illustrated in the following table

Table -7: Hypothesis Testing of Supply Chain Linkages and Non-Financial Performance

Variables	Hypothesis	Sig	$\alpha = \%$	Accepted/ Rejected
Production Quality and Non-financial Performance	H1	0.010	0.01	Accepted
On-time delivery and Non-financial Performance	H2	0.007	0.01	Accepted
Customer relationship and Non-financial Performance	H3	0.000	0.01	Accepted
Supply Chain Linkages and Non-Financial Performance.	H4	0.017	0.01	Accepted

Note: Significant * $p < .10$, ** $p < .05$, *** $p < .01$

Based on reression analysis depicted in table 6, all the independent variables are statistically significant with the dependent variable at $p < 0.01$. Hence, all the hypothesis were supported based on significant value.

11.0 DISCUSSION OF FINDINGS

The correlation analysis was performed between supply chain linkages and Non-financial Performance (NFP) of companies located within the Biyagama BOI zone. The correlation coefficient of supply chain linkages and Non-financial Performance is 0.792 at the 0.000 significant level, describing the positive and robust relationship between independent and dependent variables. It means if Supply Chain Linkages increases by 1, non-financial performance increases by 0.792. On the other hand, if Supply Chain Linkages decreases by 1, Non-financial Performance decreases by the same numbers.

According to the analysis, variables of chain linkage taken in this study; Production Quality, On-Time Delivery, and Customer Relationship together produce a substantial impact on the Non-financial Performance, which is statistically significant. Hence, it can be stated that each variable in the supply chain linkages has significant explanatory Power on the change of Non-financial Performance in the companies located in the Biyagama BOI zone. Thus it could



be generalized to the findings of the to the entire companies in the country.

Following the statistics, the B value shows how often an independent variable can influence the dependent variable while other independent variables remain constant. Overall, all the factors in the supply chain linkages in the model statistically significant as the P-value depicts 0.000, which is less than 0.05. As a result, the findings can be robust that all the independent variables in the conceptual model; Production Quality, On-Time delivery, Customer Relationships, have a significant relationship with Non-financial performance.

12.0 CONCLUSION

This study was inspired by the fundamental question of why non-financial performance varies among companies despite the fact that organizations in the Biyagama BOI zone enjoy the same facilities and infrastructure. The sample of the study comprises Manufacturing and Logistics companies in the Biyagama BOI zone. The sample includes two different industries. The manufacturing industry can be identified as one of the fastest-growing industries within Sri Lanka. Logistics Industry can be defined as a developing industry that requires a thorough insight into the development of ongoing operations. The study identifies the impact of supply chain linkages on the Non-financial Performance of two industries that execute their operations in the Biyagama BOI zone. The supply chain linkages construct on Production Quality, On-time delivery, and Customer relationship evaluated among Manufacturing and Logistics companies within the Biyagama BOI zone, Sri Lanka. The organizational relationship within an organization's supply chain was used to identify the supply chain linkage variables.

The quality of output underlines the positive results that end consumers will use through the purchase of goods or services offered by the business. To the extent the product quality, most companies focus on technology. Technical knowledge is crucial to surviving in the competition. Also, obtaining the best quality material, recruiting and training a sophisticated workforce will optimize the quality of the production or the service that the company is providing. On-time delivery focus on the benefits of delivery efficiencies though the raw material or finished products, knowledge sharing with related parties. Further, innovations gained through the relationship between upstream and downstream supply chains have been discussed to identify their impact on the Supply chain performance. Standardization of procedures between suppliers and buyers has been included as one of the benefits of the supply chain linkages.

Customer relationship indicates Supplier's summarizing quick response, make sure order delivery on time and sharing knowledge to improve final supply products to the customer will reduce the risk faced by an organization. On the other hand, buyers respond to the products, reduce the cost of carrying, make the payments on time, and helping new product development ideas reduce the risk faced by an organization. Based on its impact on the Non-financial Performance, the Production Quality, on-time delivery, and Customer relationship substantially impact the Supply chain performance. Hence, Production Quality, on-time delivery, and Customer relationship explain 64.3% of the variation in Non-financial Performance of listed companies in the Biyagama BOI zone. Furthermore, Research studies



showed that work-specific supply chain linkages affect non-financial performance and employee productivity and managerial employees. Results also showed that particular independent variables primarily influence the supply chain linkages in both industries. This linkages could bring a more significant impact on non-financial performance. The findings of this study suggested that the supply chain operations and logistics responsibilities play a crucial role in ensuring supply linkages.

Further, this study carry out performance responsibilities for making employees work to improve the Non-financial performance of the organizations located within the Biyagama BOI zone. This study only evaluated the Supply chain linkages and Non-financial Performance of firms located within the Biyagama BOI zone and the generalizability received robust results. However, more samples outside the Biyagama zone may provide a deviated result. Thus, future research could be conducted in listed companies in the Colombo Stock Market (CSE) in Sri Lanka.

13.0 RECOMMENDATION AND DIRECTION FOR FUTURE STUDIES

This study offers a potential route to evaluate Delivery On-time, Quality of Production, and Customer Relationship of companies located in Biyagama BOI Zone. It has a significant effect on the Non- Financial performance in this segment. The strength of a supply chain is recognized from the ability to satisfy customer needs. Executives at the organizational-level should think about the additional advantages and ways to raise the current service methods. Upstream and downstream productivity and knowledge are essential to supply chain success. Hence, future research can be resume by incorporating major Key Performance Indicators (KPI's) of supply chain management such as planning, operation, delivery of products & services to customers, and post-delivery with the overall performance of the organizations.

Companies receive novel technologies and new concepts from their customers and suppliers, which significantly impact organizational success. The importance of standardizing the procedures for delivering goods on time between suppliers and buyers is minimal. Furthermore, management involvement is needed to reduce the risk faced by the organization. Order reply times and supplier order distribution need to be better structured to reduce stock fear at a pinnacle of demand. Business information and innovations exchanged with suppliers minimize the risk while enhancing market trend awareness. The management must carry out market research to identify buyers' response to the products to reduce the impact of the Bullwhip effect. The bullwhip effect results in goods being stored in the warehouses due to wrong information received and more than the market demand. The buyer payment pattern should be analyzed to reduce the risk of decreasing financial resources. A significant advantage of supply chain challenges is managing the firms' supply-chain partners. Also, supply chain firms should place a greater focus on valuing their supply partners, minimizing the use of fixed assets, including warehouses and vehicles, while also increasing cash flow. The management must consider the consumer ideas on new product development to reduce the uncertainty of consumer preferences.



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