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Influence of Customer Relationship on Supply Chain Performance in Telecommunication Industry

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Abstract

This study aimed to explore the relationship between customer relationships and supply chain performance, with a focus on mediating role of logistics integration as well as whether this relationship is mediated by logistics integration. The study was conducted among 361 employees from 21 Malaysian telecommunication firms in Malaysia by applying a structural equation modeling with SmartPLS. Findings revealed customer relationship associated with supply chain performance and supported. However, the study found that the mediating effect of logistics integration in the relationship between customer relationships and supply chain performance was not statistically significant.

Keywords: Customer relationship; Logistics integration; Telecommunication; Supply Chain Performance

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1.0 Introduction

Supply Chain Management (SCM) is crucial in today's corporate sector, including the telecommunications industry, providing competitive advantages. Monitoring Supply Chain Performance (SCP) is essential for overall business performance evaluation. SCP aims for long-term market share assessment and short-term cost-cutting measures. The rapid expansion of telecommunications, particularly in Malaysia with the 5G special purpose and Celcom-Digi merger, is transforming the market. Despite the impact of COVID-19, the Malaysian telecommunication industry is enhancing enterprise capabilities due to high expectations for 5G adoption and industry growth (Alfi, 2021). With increasing competition and customer demand for affordable yet high-quality services, optimizing SCM is imperative for the telecommunication industry in Malaysia. In 2020, there was an increase in data usage, driven by factors such as widespread remote work, growth in content streaming, and limited fiber infrastructure in the country. In 2021, saw growth in mobile subscriptions and connectivity. As of January 2021, Malaysia had 39.99 million mobile connections, though there was a decrease of 72,000 mobile connections from January 2020 to January 2021. By 2021, the number of mobile connections in Malaysia equaled 122.8 percent of the total population, possibly indicating that individuals may possess more than one mobile connection (MCMC, 2021).

The Malaysian Communications and Multimedia Commission (MCMC) plans to regulate industries in response to citizen demand for affordable telecommunication services. The Ministry of Science, Technology, and Innovation endorses this initiative. The MCMC's goal is to encourage industry players to develop suitable telecommunication technologies and position Malaysia as a regional information technology hub. The focus of the study is on the telecommunications sector in Malaysia, given its significant contribution to the economy.

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Effective management of the supply chain is emphasized as crucial for maintaining a competitive advantage among businesses in the sector.

The telecommunications sector in Malaysia plays a significant role in financial activities with customer (Mohammed et. al, 2020). To stay competitive in the global market, technological advancements and globalization, the Malaysian telecommunications industry needs to enhance internal strategies and operations. This includes a focus on customer-centric supply chain management, effective stakeholder communication, and logistical strategies. Improvements in internal information systems and a global supply chain that extends beyond individual corporations are crucial. The quality of service provided by telecommunication companies directly influences customer satisfaction and loyalty. Research has shown that factors such as network reliability, call quality, responsiveness of customer support, and billing accuracy play crucial roles in shaping customer perceptions and behaviors (Wu & Chen, 2017). The study aims to examine the relationship between customer relationship and SCP.

Besides that, telecommunication companies often face unique challenges in integrating logistics within their supply chains. These challenges may include managing the distribution of physical products such as devices, equipment, and SIM cards, as well as coordinating the installation and maintenance of network infrastructure across diverse geographic regions. Therefore, the objective is to examine the relationship between customer relationship and SCP mediated by logistics integration.

2.0 Literature Review

2.1 Malaysia Telecommunication

The telecommunications sector in Malaysia has experienced significant growth over the past three decades, driven by evolving global business conditions and meeting both local and global market requirements (Abdul Manaf et al., 2021). The telecommunications industry is a vital sector in Malaysia, making significant contributions to the country's economy. Recognizing its importance, the Malaysian government takes proactive measures to foster and support the sector, aiming to enhance competitiveness on a global scale. Both the government and businesses need to actively engage at national and international levels to position Malaysia as a progressive hub for the telecommunications industry. To lead sectoral growth, Malaysia must actively participate in research and development initiatives. While the government aims to create a competitive environment and equal opportunities, the introduction of competition in the telecommunications industry will be phased, starting with value-added services and progressing to infrastructure and other services. Despite encouraging competition, the government retains the authority to determine the number of economically viable competitors for specific telecommunications services (Abdul Rahim, 2013).

2.2 Customer Relationship

The concept of customer relationship generally involves managing customer complaints, enhancing satisfaction, and fostering long-term interactions to benefit organizational performance through supply chain management practices. Ultimately, fostering strong customer relationships can contribute to improved supply chain performance (Sundram et al., 2011).

Building long-term relationships with customers is a fundamental goal in the telecommunication industry. Research has examined the concept of relationship marketing and its impact on customer lifetime value, emphasizing the importance of nurturing customer relationships over time to maximize profitability and sustainable growth (Kumar & Reinartz, 2018).

Numerous studies in the telecommunications industry emphasize the importance of customer retention and loyalty. High customer churn rates can significantly impact profitability, making it essential for telecom companies to invest in CRM strategies aimed at building long-term relationships with customers (Nguyen & Mutum, 2012)

Scholars emphasize two critical factors for effective supply chain management and improved performance: customer relationship management and information systems. The effectiveness of supply chain management is influenced by customer focus, impacting supply chain relationship capabilities (Liu, et. al, 2020). The integration of suppliers and customers is linked to an organization's financial performance (Ataseven & Nair, 2017). Additionally, a customer oriented supply chain management is suggested to sustain the market and enhance performance efficiency over time.

Mazikana (2023) highlighted the distinctiveness of customer expectations, satisfaction, performance perception, and retention in the context of telecommunication service quality in Malaysia. They emphasized the importance of understanding and fulfilling customer needs, suggesting that managers who overlook customer expectations may face challenges in today's competitive market.

2.3 Logistics Integration and Supply Chain Performance

The concept of Logistics Integration (LI) is defined as the implementation of practices and active activities that synchronize the process of acquiring materials from suppliers to customers through the value stream (Madzimore, 2019). In the telecommunications industry, there exists interdependence between transportation and LI, as each logistical activity necessitates transportation to enhance traffic with transportation improvement. The components of transportation includes logistics systems, encompassing water transport, air transport, and land transport. LI is a crucial factor in evaluating supply chain performance (Oubrahim, et al, 2023), serving as a novel criterion for organizations to assess their performance with suppliers (Ashenbaum & Maltz, 2017).

Research has provided evidence that LI significantly influences organizational performance, and supply chain managers perceive overlaps in the roles of purchasing and logistics managers (Madzimore, 2019). The shared responsibility in selecting a supplier to influence logistics collaboration, along with relationship history, has a substantial impact on logistics performance (Aharonovitz et al.,

2018). Logistics and purchasing supervisors play a significant role in influencing supplier performance (Ashenbaum & Maltz, 2017). Wu et. al, (2021) also posited that the development of LI contributes to the rise of operational benefits and customer experience.

Traditionally, logistics focused on the outbound flow of finished products and services, emphasizing physical distribution and warehouse management. However, due to industrial globalization and transportation deregulation, logistics has evolved beyond outward flows, now including materials management and physical distribution as integral aspects (Chen et al., 2020).

Hence, the hypotheses are as follows:

- I. Hypothesis 1: There is a relationship between customer relationship and SCP.
- II. Hypothesis 2: LI mediates the relationship between customer relationship and SCP.

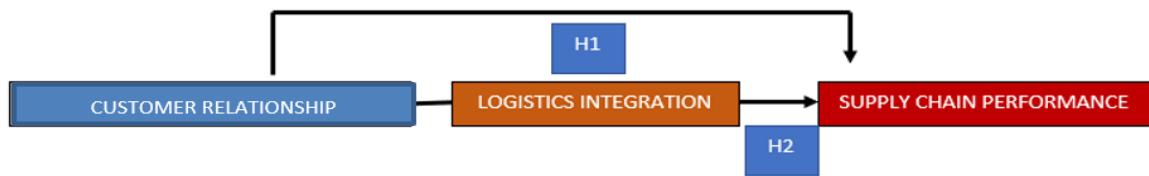


Fig 1: Theoretical Framework

3.0 Methodology

In this research, questionnaires were utilized as the primary tool for data collection. The survey method is chosen using A-Likert Scale (1= Disagree Very Strongly ; 7= Agree Very Strongly). The survey instrument is adapted from Sundram et al, (2011), Jabbour, Filho, Viana, & Jabbour (2011) and Danial Projogo (2012). The gathered data underwent analysis to fulfill research objectives, address inquiries, and validate proposed hypotheses. The sample size determination methodology followed criteria highlighted by Sekaran and Bougie (2016), considering factors such as precision level, confidence level, population variability, cost, time constraints, and population size. A simple random sampling technique was employed to participants, employees from the telecommunications sector who deals with the customer from sales and enterprise department. The suitability of simple random sampling is emphasized in situations where an accurate and easily obtainable list exists. The study involved 361 respondents from 21 Malaysian telecommunication firms, utilizing structural equation modeling with SmartPLS for analysis.

4.0 Findings

The Cronbach's alpha value for the independent variable related to customer relationship is 0.81, indicating that 81% of the variance is reliable. Similarly, the Cronbach's alpha values for the dependent variable SCP and the mediator LI are 0.80 and 0.81, respectively. To assess the relationship between variables, a structural model evaluation was conducted after validating and ensuring the reliability of the measurement model. The results of the structural model allowed the researcher to evaluate how well the data supported the idea, following the guidelines established by Hair et al. (2019). These guidelines include examining collinearity issues, the path model, coefficient of determination (R²), effect size (f²), and mediation effect, as detailed in subsequent sections. Following the assessment of the results and the model, the research hypotheses were discussed.

4.1 Loading, Composite Reliability and Average Variance Extracted

Table 1 displays the results of convergent validity measured by AVE values. The AVE values for each construct exceeded 0.5. This specifies that more than 50% of the respective indicator variances were predicted by their latent variables. The Fornell-Larcker criterion was employed to evaluate the discriminate validity at the construct level. Table 1 shown that the AVE value of every latent variable was larger than the latent constructs' utmost squared correlation with any other latent construct.

Table 1 Loadings, Composite Reliability and Average Variance Extracted

Indicator	Loading	Composite Reliability	Average Variance Extracted
Customer Relationship			
Organization frequently interacts with customers to set its reliability, responsiveness and other standards	-0.40	0.81	0.54
Organization frequently measures and evaluate customer satisfaction	0.42	0.81	0.54
Organization frequently determines future customer expectation	-0.35	0.81	0.54
Organization facilitates customers' ability to seek assistance from it	0.36	0.81	0.54
Organization periodically evaluates the importance of its relationship with its customer	0.72	0.81	0.54
Organization consults customers to support their product	0.95	0.81	0.54
<i>Cronbach's Alpha</i>		0.81	0.54

Composite Reliability	0.42	0.81
Average Variance Extracted (AVE)	0.34	0.52

4.2 Collinearity Test

Table 2 Collinearity test

	Logistics Integration	SCP
Customer Relationship	1.283	1.283
Logistics Integration		1.719

4.3 Path Model

The path coefficients were computed to evaluate the capability of the independent variables for logistics integration. The regression weight (β) for the independent variables of customer relationship ($\beta = 0.18, p < 0.05$). Thus, H1 were supported while the regression weight (β) for mediator (Logistic Integration) and SCP was ($\beta = -0.01, p < 0.05$), which was reported to be not significant.

Table 3 Results of Structural Model (Including Mediating Effect of Intention)

Hypothesis	B	S.E	T.S	P	Confidence intervals	
					Low	Up
Customer relationship -> SCP	0.18	0.02	10.43	0.00	0.14	0.21
Customer relationship-> Logistics Integration	-0.01	0.04	0.38	0.70	-0.08	0.05
Logistics Integration -> SCP	0.56	0.03	21.14	0.00	0.51	0.61

Note: Regression weight (β); Mean (M); Standard Error (S.E); T Statistics T.S; P

4.4 Coefficient of Determinants

As per the guideline established by Hair et al. (2019), the coefficient of determination (R^2) was measured to assess the model's predictive accuracy. Table 4 shows the model of research which explains 41.8 % of the total variance in logistics integration selection and 94.2% of the total variance in SCP. It suggests that the exogenous latent variables collectively explain 41.8% and 94.2% of the variance of logistics integration and SCP. Hence, based on Falk and Miller's (1992); criteria, the two endogenous latent variables showed acceptable levels of R-squared values, which logistics integration was considered as moderate.

Table 4 Coefficient of determination (R^2)

	R Square	R Square Adjusted
Logistics Integration	0.418	0.414
SCP	0.942	0.941

4.5 Effect Size

Other than assessing the R^2 values for each endogenous construct, it was suggested to describe the effect size of exogenous constructs (f^2). The f^2 value denotes to the variation in the R^2 value when a stipulated exogenous construct is contained (Hair et al., 2019). This is done to reveal which exogenous variables have a practical influence on the endogenous variables. Hair et al. (2019) highlighted the values of 0.425, and 3.081 are large effects, correspondingly. The values of f^2 were determined using SmartPLS as outlined in Table 5.

Table 5 Effect size (f^2)

Exogenous Constructs	Logistics Integration (Mediator)	SCP (Endogenous construct)
Customer Relationship	0	0.425
Logistics Integration		3.081

4.6 Mediation Effect

Based on the mediation effect's assessment criteria (Zhao et al., 2010) of three steps were performed to test the mediator effect's hypotheses H2.

Table 6 Path model result (direct and total effects)

Hypothesis	β	T.S	P
Indirect effects			
Customer Relationship-> SCP	-0.01	0.37	0.71
Total (direct) effect on SCP			
Customer Relationship-> SCP	0.18	10.71	0.00

Total (direct) effect on LI			
Customer Relationship -> Logistics Integration	-0.01	0.40	0.69
Logistics Integration -> SCP	0.56	22.34	0.00

Regression weight (β); T Statistics T.S; P Values (p)

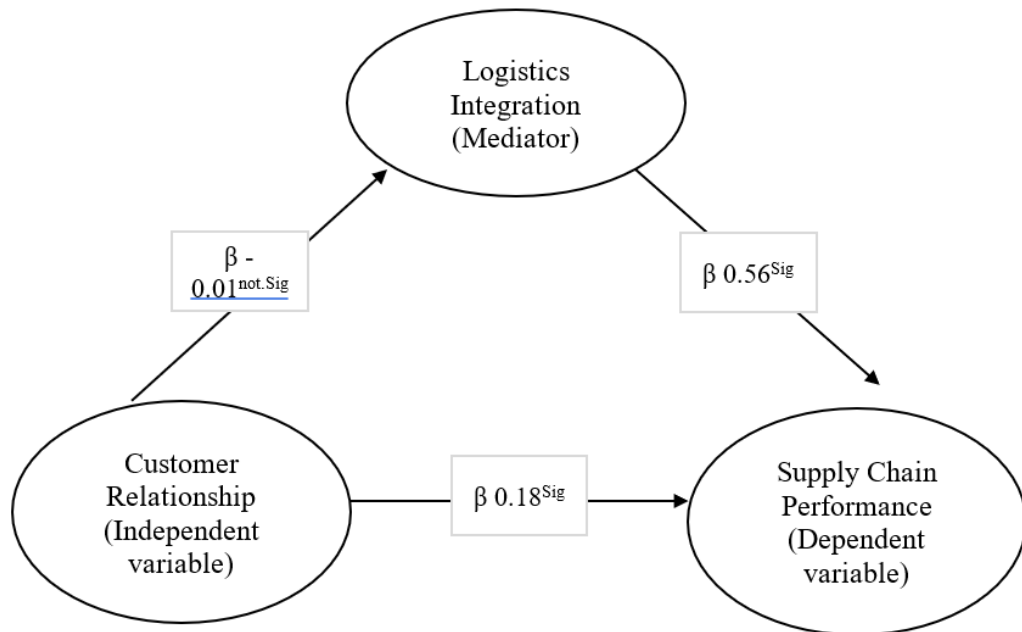


Figure 2 Three steps mediation effect for H2

Step1: The effect of Customer Relationship (Independent variable) on Logistics Integration (mediator) was not significant ($\beta -0.01$; $p < 0.05$)

Step2: The effect of Logistics Integration (mediator) on SCP (Dependent variable) was significant ($\beta 0.56$; $p < 0.05$)

Step3: The effect of Customer Relationship (Independent variable) on SCP (Dependent variable) was significant ($\beta 0.18$; $p < 0.05$)

Since the effect of Customer Relationship (Independent variable) on Logistics Integration (mediator) was not significant, there was no mediation, and H2 (b) was rejected.

4.7 Summary of hypotheses result.

Table 7 Summary of Hypotheses Findings

Hypotheses	Statements	Findings
H1	There is a relationship between customer relationship and supply chain performance	Supported
H2	Logistics integration relationship mediates the relationship between customer relationship and supply chain performance	Not Supported

5.0 Discussion

The findings reveal a significant and positive relationship between customer relationships and supply chain performance, supporting hypothesis H1. Sustaining good customer relationships is shown to increase the likelihood of success customer relationship. Close customer relationships are highlighted to expand the values provided to customers and maintain loyalty through satisfaction. The study highlights the importance of customer relationships as a critical success factor in the supply chain performance. The study's results align with previous research indicating that customer relationship influence supply chain performance, as observed in studies by Das & Hassan (2021). According to existing literature, maintaining close customer relationships expands the value offered to customers, fostering loyalty through customer satisfaction. The ability to learn from and collaborate with consumers represents a unique

organizational skill. In the logistics sector, sustaining positive customer relationships is identified as a crucial success factor (Cichosz et al., 2017). Additionally, addressing consumer feedback appropriately demonstrates the applicability of effective supply chain management practices in enhancing overall supply chain performance. The findings of this study are consistent with other research, such as a study on the impact of customer firm characteristics on supplier financial performance in manufacturing and service industries, which found that the positive effect of customer degree centrality on supplier performance is more pronounced when there is a high level of resource dependence between a customer and its supplier (Dong-Young et al., 2020). Similarly, Nenavani & Jain (2021) demonstrated that customer relationships contribute to improved supply chain responsiveness, subsequently enhancing operational performance. Existing literature also suggests that a customer firm's central network position increases the likelihood of developing a shared understanding of structural configurations, allowing better control of information flow (Dong-Young et al., 2020; Xu et al., 2018). However, the mediating effect of logistics integration in the relationship between customer relationship and supply chain performance was found to be not significant, contrary to hypothesis H2. The impact of customer relationships on supply chain performance may be predominantly direct, without relying heavily on an intermediary like logistics integration. If the direct influence of customer relationships is strong enough, the mediating role of logistics integration may be less pronounced or significant. Industries vary in terms of their supply chain structures, customer interactions, and logistics requirements. It is likely that in the telecommunications sector, other factors or processes have a more direct impact on supply chain performance than logistics integration. Despite this, the direct effect of customer relationships on supply chain performance was accepted, indicating that customer relationships directly enhance the level of supply chain performance. These results align with past studies emphasizing the influence of customer relationships on supply chain performance.

6.0 Conclusion & Recommendations

The study concludes that an improvement in supply chain performance is associated with good customer relationships. This finding holds implications for practitioners involved in decision-making processes related to Supply Chain Management (SCM), particularly within the telecommunications industry. The framework developed in this study can be considered and replicated in other case studies or diverse industries, enabling comparisons with the telecommunication sector and providing valuable insights for decision-makers in those contexts. However, there are no mediating effect of logistics integration in the relationship between customer relationship and supply chain performance was found. For recommendations, implement a robust system for monitoring and measuring supply chain performance. By regularly assessing key performance indicators (KPIs), it can identify areas for improvement and take corrective actions promptly, irrespective of the influence of logistics integration.

7.0 Limitation of the Study

This study only used customer relationship as the supply chain management practices. Ultimately, it will be helpful to explore other variables of supply chain management practices such as inventory management and risk mitigation and compliance.

Acknowledgement

Gratitude to all the participants who took part in the conducted survey. Your contribution is greatly appreciated.

Paper Contribution to Related Field of Study

The study results in the importance of customer relationships as a significant factor influencing SCP within the telecommunications industry in Malaysia. These findings provide empirical evidence that customer relationships play a substantial role in contributing to SCP, enhancing the theoretical framework, and deepening the understanding of SCP dynamics in the context of Malaysia's telecommunications sector.

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