Library Progress International *Print version ISSN 0970 1052*
Vol.44, No.4, Jul-Dec 2024: P.1678-1685 *Online version ISSN 2320 317X*

Original Article *Available online at www.bpasjournals.com*

The Mediating Role Of Strategic Alliance On The Relationship Between Uncertainty, Integration, Supply Chain Flexibility And Supply Chain Performance

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How to cite this article: Ng Choon Seong,Badrul Hisham Kamaruddin (2024). The Mediating Role Of Strategic Alliance On The Relationship Between Uncertainty, Integration, Supply Chain Flexibility And Supply Chain Performance. *Library Progress International,* 44(4), 1678-1685

Abstract

A supply chain management (SCM) practise is a grouping of at least three different things (people, organisations, or developments) or a multi-dimensional development that includes both the upstream and downstream parts of the supply chain. The objective of this study is to identify the key factors influencing supply chain management practices in Logistics Company. A total of 148 respondents' responses were gathered by the researcher for this study. Quantitative method was used, and questionnaires were distributed to all respondents. Based on the results, we can conclude that Uncertainty, Flexibility and Integration in Supply Chain Management and Supply Chain Management Performance have a statistically significant linear relationship. In addition, it can be concluded that the indirect effect between Uncertainty, Flexibility and Integration in Supply Chain Management (X) and Supply Chain Management Performance (Y) through the mediating variable Strategic Alliance in Supply Chain Management (M) is statistically significant. The findings of this study are significant because they shed light on the various SCM antecedents that influence business success in Malaysia's logistics sector.

Keywords—Supply Chain Management, Uncertainty, Flexibility, Integration, Strategic Alliance

INTRODUCTION

Global logistics firms are embracing green manufacturing methods due to growing environmental awareness and concerns, which has led to SMEs using green practises in their operations. The significance of SMEs working in the assembly area of the logistics sector is growing in the Malaysian economy (Hanaysha et al., 2022). Several organisations, most notably the government, have given SMEs in the logistics sector a high value due to their important economic contribution. A number of initiatives have been established to help SMEs position themselves better in the logistics industry (Khalique et al., 2011). Government and society now need to address environmental concerns (Hanaysha et al., 2022). As the world's population continues to rise and asset accessibility declines, organisations are starting to realise that supply chains need to be redesigned (Carter and Jennings, 2012). A lot of experts have lately indicated that the supply chain's fate is manageability as a result of this unavoidable conundrum (Carter and Jennings, 2002; Murphy and Poist, 2002). Supply chain management (SCM) is becoming more popular as a result since it may assist

to lessen the negative impacts of mechanical cycles while also enhancing a company's competitive edge (Rao, 2006). A close reading of the material reveals that the three-manageability metrics (financial, ecological, and social) that make up the larger concept of manageability are not evaluated simultaneously (Seuring and Muller, 2008; Hanaysha & Alzoubi, 2022). Numerous of these investigations emphasised natural, operational, and financial execution (Zhu et al., 2005; Azevedo et al., 2011; De Giovanni and Esposito Vinzi, 2012; Green et al., 2012). In the writing, which mostly applied to developed economies, the significance of a social measurement to SCM was examined. Eltayeb et al. (2011) asserted that immaterial results such as organisation image, item image, representative fulfilment, and client devotion or fulfilment had not gotten much attention as SCM results, despite studies such as Testa and Iraldo (2010) and Xie and Breen (2012) claiming that SCM can improve brand image, partner relations, and work force inspiration (Lee et al., 2022). Although there has been much study on the effects of green practises on operational, natural, and financial execution, no studies have looked specifically at the effects of green practises on elusive execution, natural execution, or financial

execution. According to the Malaysian Logistics Organization, this study examines SCM methodologies and how they affect the performance of Malaysian ISO 14001 certified assembly SMEs in the logistic industry (FML).

The existing literature underscores the importance of sustainability in SCM, emphasizing financial, ecological, and social dimensions. However, a significant gap exists in the simultaneous evaluation of these three metrics, particularly in developing economies like Malaysia. Previous studies predominantly focus on operational, environmental, and financial aspects (Shaharudin, et al., 2022), often neglecting the social dimension. This omission leaves a gap in understanding the broader implications of SCM on societal well-being, particularly in terms of employee satisfaction, community engagement, and ethical sourcing practices. Addressing this gap is vital for designing SCM models that are holistically sustainable.

Much of the literature on SCM and sustainability focuses on developed economies, with limited empirical studies exploring the unique challenges and opportunities faced by SMEs in Malaysia's logistics industry. The Malaysian context, characterized by government-driven initiatives and increasing environmental awareness, offers a fertile ground for examining the interplay between SCM strategies and economic, ecological, and social performance. By focusing on ISO 14001 certified SMEs, future research can provide insights into how global standards influence local practices and outcomes.

While green practices are gaining traction in the logistics industry, their specific impact on SCM performance metrics—particularly in the context of ISO 14001 certified SMEs— remains inadequately studied. The research gap extends to understanding how these practices influence not only tangible outcomes like cost savings and operational efficiency but also intangible benefits such as enhanced reputation and stakeholder trust. The study by Agnihotri & Gabler, (2024) suggests that green SCM practices can drive competitive advantage, yet a deeper exploration of this relationship is needed to substantiate these claims.

The interplay between SMEs, sustainability, and supply chain management (SCM) represents a complex and evolving research area. Addressing identified gaps requires an integrated approach combining qualitative and quantitative methods. Comprehensive sustainability metrics encompassing financial, ecological, and social dimensions are vital for understanding the holistic impact of SCM on Malaysian SMEs. Frameworks that evaluate these metrics can provide deeper insights tailored to the logistics sector's unique challenges.

Technology's role in SCM efficiency remains underexplored, especially in overcoming barriers like cost and training. Understanding these challenges can guide SMEs in leveraging tools for optimal supply chain processes. Finally, the link between green practices and SCM performance in ISO 14001 certified SMEs is crucial. Empirical studies can reveal how sustainability certifications influence competitive advantage and long-term outcomes.

Addressing these gaps will advance academic knowledge and empower SMEs with strategies to enhance logistics operations, contributing to economic growth and sustainable development in Malaysia.

I. LITERATURE REVIEW

There are a few investigations that talk about the supply chain vulnerability as it is eluded as the cycle of choice making in the supply chain in which leader isn't precisely mindful of choice which ought to be taken because of need of the straightforwardness of the supply chain (SC) just as its effect over potential activities. Another investigation portrays SC vulnerability as the difference in the equilibrium just as productivity in the activities of the supply chain which can brought about by the capricious and likely occasions wherein reaction is needed for restoring an equilibrium (Scholten et al., 2020). This startling occasion in the field of supply chain may be unforeseen request, late in conveyance from the finish of the providers or breakdown in basic creation hardware. The supply chain incorporation (SCI) is known as the degree to which the firm coordinates with different accomplices of SC in request to accomplish the compelling and effective progression of data, choices, items, data and cash in terms of recurrence, worth and ease (Tse, et al. 2016). Coordinating with the accomplices of SC upgrades the nature of the help of the association. SCI is viewed as shown as it has a positive

connection with the presentation of the firm though there are a few kinds of exploration that show that there is no impact of the SCI over the execution of the association though it is explored that the SC deftness has likewise a few effects over the execution of the association (Gligor, et al. 2019). It is additionally considered as there is a positive just as the direct relationship among the SCI and SC deftness. In any case, the SC readiness shows how quick the SC give reactions to the changes that are set up in the climate, inclinations of the clients, serious powers and so forth This cycle doesn't consider the arbitrary varieties which happen in the execution of everyday chain activities. It might determine the path by which the SC cycle of the organization gives reactions to the changes, once there is outer that effects the business which may are positive or negative to accomplish the destinations (Basheer & Hassan, 2019). It is known as the proportion of the route by which the organizations can adjust the SC cycle for the progressions and how quick it can accomplish it.

II. RESEARCH METHODOLOGY

The selection of survey participants and the technique used to administer the survey are both important considerations during the main data collection procedure, which is covered in detail in this chapter. Additionally, data collection tools are made available. Population for this study are the respondents from three organizations within the supply chain sector in Selangor Malaysia that actively engage in supply chain management practices. Given this, the researcher expects these organizations within the supply chain sector in Selangor Malaysia to yield a minimum of 148 eligible participants for the study. As a result, the method of convenience sampling is the most suitable approach for my investigation.

A. Research Framework

The research framework of the study is depicted in the Fig.

1.

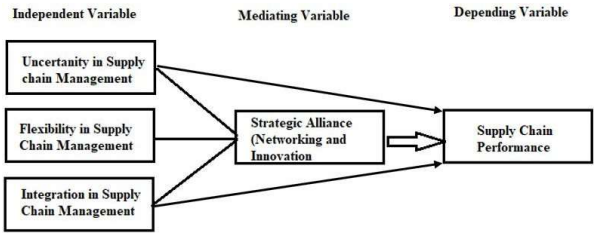

Fig. 1. Research Framework

B. Data Analysis Method

The statistical significance of each variable is determined with the help of SPSS 24. We were able to obtain descriptive statistics after computing the questions in variable form. Descriptive statistics, computed from raw data, can describe a condition. This structure allows for the use of descriptive statistics in the research procedure. Descriptive statistics offer a helpful framework for organizing data. Then, we tested the relationship between variables using correlation test and mediating test.

III. RESULTS

The results of the study were discussed.

A. Hypothesis Testing

H1: There is a significant relationship between uncertainty in supply chain management (SCM) and supply chain performance (SCP)

Table I presents the relationship between uncertainty in supply chain management (SCM) and supply chain performance (SCP).

TABLE I. CORRELATION BETWEEN UNCERTAINTY IN SUPPLY CHAIN MANAGEMENT (SCM) AND SUPPLY CHAIN PERFORMANCE (SCP)

		Supply Chain Management Performance
Uncertainty in Supply Chain Management	Pearson Correlation	.816**
	Sig. (2-tailed)	.000
	N	148

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

Based on the result in Table I, the Pearson correlation coefficient, r, for Uncertainty in Supply Chain Management and Supply Chain Management Performance is 0.816, and that it is statistically significant ($p = 0.000$). Based on the results, we can conclude that Uncertainty in Supply Chain Management and Supply Chain Management Performance has a statistically significant linear relationship. The direction of the relationship is positive (i.e., Uncertainty in Supply Chain Management and Supply Chain Management Performance is positively correlated), meaning that these variables tend to increase together (i.e., greater Supply Chain Management Performance is associated with greater Uncertainty in Supply Chain Management). The magnitude, or strength, of the association is approximately strong ($0.8 < | r | < 0.9$).

Hence, Hypothesis 1 accepted, there is a significant relationship between uncertainty in supply chain management and supply chain management performance in the logistic items industry Malaysia.

H2: There is a significant relationship between flexibility in supply chain management (SCM) and supply chain performance (SCP)

Table II presents the relationship between flexibility in supply chain management (SCM) and supply chain performance (SCP).

TABLE II. CORRELATION BETWEEN FLEXIBILITY IN SUPPLY CHAIN MANAGEMENT (SCM) AND SUPPLY CHAIN PERFORMANCE (SCP)

		Supply Chain Management Performance
Flexibility in Supply Chain Management	Pearson Correlation	.806**
	Sig. (2-tailed)	.000
	N	148

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

Based on the results in Table II, the Pearson correlation coefficient, r, for Flexibility in Supply Chain Management and Supply Chain Management Performance is 0.806, and that is statistically significant (p = 0.000). Based on the results, we can conclude that Flexibility in Supply Chain Management and Supply Chain Management Performance has a statistically significant linear relationship. The direction of the relationship is positive (i.e., Flexibility in Supply Chain Management and Supply Chain Management Performance is positively correlated), meaning that these variables tend to increase together (i.e., greater Supply Chain Management

Performance is associated with greater Flexibility in Supply Chain Management). The magnitude, or strength, of the association is approximately strong ($0.8 < | r | < 0.9$).

Hence, Hypothesis 2 accepted, there is a significant relationship between flexibility in supply chain management and supply chain management performance in the logistic items industry Malaysia.

H3: There is a significant relationship between integration in supply chain management (SCM) and supply chain performance (SCP)

Table III presents the relationship between integration in supply chain management (SCM) and supply chain performance (SCP).

TABLE III. CORRELATION BETWEEN INTEGRATION IN SUPPLY CHAIN MANAGEMENT (SCM) AND SUPPLY CHAIN PERFORMANCE (SCP)

		Supply Chain Management Performance
Integration in Supply Chain Management	Pearson Correlation	.819**
	Sig. (2-tailed)	.000
	N	148

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

Based on the result in Table III, the Pearson correlation coefficient, r, for Integration in Supply Chain Management and Supply Chain Management Performance is 0.819, and that it is statistically significant (p = 0.000). Based on the results, we can conclude that Integration in Supply Chain Management and Supply Chain Management Performance has a statistically significant linear relationship. The direction of the relationship is positive (i.e., Integration in Supply Chain Management and Supply Chain Management Performance is positively correlated), meaning that these variables tend to increase together (i.e., greater Supply Chain Management Performance is associated with greater Integration in Supply Chain Management). The magnitude, or strength, of the association is approximately strong ($0.8 < | r | < 0.9$).

Hence, Hypothesis 3 accepted, there is a significant relationship between integration in supply chain management and supply chain management performance in the logistic items industry Malaysia.

H4: Strategic alliance mediates a relationship between uncertainty and supply chain performance (SCP)

Table IV presents the relationship between Strategic alliance mediates a relationship between uncertainty and supply chain performance (SCP).

TABLE IV. TOTAL EFFECT BETWEEN UNCERTAINTY IN SUPPLY CHAIN MANAGEMENT (X) AND SUPPLY CHAIN MANAGEMENT PERFORMANCE (Y)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.268	.205		-1.304	.194
	Uncertainty in Supply Chain Management	.959	.056	.816	17.027	.000

Firstly, the total effect between Uncertainty in Supply Chain Management (X) and Supply Chain Management Performance (Y) will be tested. If there is no statistical significance, there will be no need to perform a mediation analysis. We will be able to validate the total effect of Uncertainty in Supply Chain Management (X) and Supply Chain Management Performance (Y) by employing a simple linear regression in SPSS. Table 4.12 presented the total effect between Uncertainty in Supply Chain Management (X) and Supply Chain Management Performance (Y).

H5: Strategic alliance mediates a relationship between flexibility and supply chain performance (SCP)

Figure 2 presented the mediation analysis diagram between Strategic alliance, flexibility, and supply chain performance (SCP).

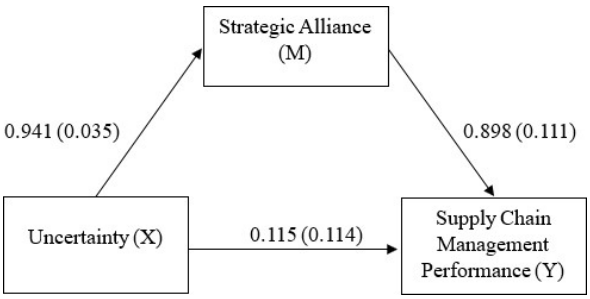

Fig. 2. Mediation Analysis

It can be concluded that the indirect effect between Uncertainty in Supply Chain Management (X) and Supply Chain Management Performance (Y) through the mediating variable Strategic Alliance in Supply Chain Management (M) is statistically significant. Therefore, Strategic Alliance in Supply Chain Management (M) has the mediating effect between Uncertainty in Supply Chain Management (X) and Supply Chain Management Performance (Y). Hence, Hypothesis 5 accepted, there is a significant relationship between uncertainty in supply chain management and supply chain management performance mediated by strategic alliance in supply chain management.

H6: There is a significant relationship between flexibility in supply chain management and supply chain management performance mediated by strategic alliance in supply chain management

Figure 3 presented the mediation analysis diagram between Flexibility in Supply Chain Management (X) and Supply Chain Management Performance (Y) with Strategic Alliance in Supply Chain Management (M) as the mediating variable.

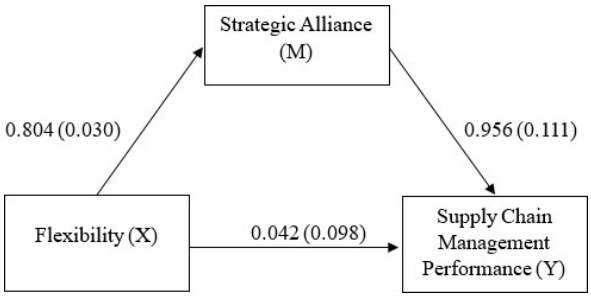

Fig. 3. Mediation Analysis

It can be concluded that the indirect effect between Flexibility in Supply Chain Management (X) and Supply Chain Management Performance (Y) through the mediating variable Strategic Alliance in Supply Chain Management (M) is statistically significant. Therefore, Strategic Alliance in Supply Chain Management (M) has the mediating effect between Flexibility in Supply Chain Management (X) and Supply Chain Management Performance (Y). Hence, Hypothesis 6 accepted, there is a significant relationship between flexibility in supply chain management and supply chain management performance mediated by strategic alliance in supply chain management.

H7: Strategic alliance mediates a relationship between integration and supply chain performance (SCP)

Figure 4 presented the mediation analysis diagram between Integration in Supply Chain Management (X) and Supply Chain Management Performance (Y) with Strategic Alliance in Supply Chain Management (M) as the mediating variable.

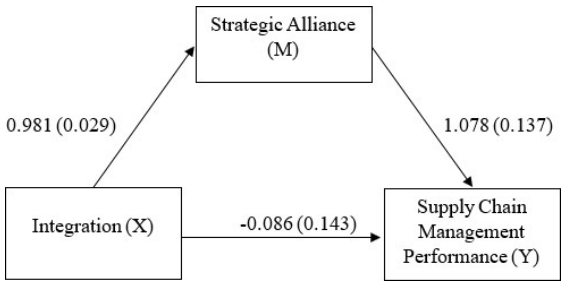

Fig. 4. Mediation Analysis

It can be concluded that the indirect effect between Integration in Supply Chain Management (X) and Supply Chain Management Performance (Y) through the mediating variable Strategic Alliance in Supply Chain Management (M) is statistically significant. Therefore, Strategic Alliance in Supply Chain Management (M) has the mediating effect between Integration in Supply Chain Management (X) and Supply Chain Management Performance (Y). Hence, Hypothesis 7 accepted, there is a significant relationship between integration in supply chain management and supply chain management performance mediated by strategic alliance in supply chain management.

IV. CONCLUSION

Despite the continuous expansion of the logistics industry and the introduction of cutting-edge technologies into both domestic and international supply chains, there are a few fundamental problems that continue to exist. In this piece, we will take a look at some of the most common problems that occur in the field of logistics, as well as discuss potential solutions to these problems. It is impossible to guarantee that everything will run smoothly all the time in warehouses and distribution centres because there are just too many moving parts. It is possible for human error to result in significant losses if it is not controlled. These losses may have been brought about by a variety of factors, such as missing inventory, orders that were not properly packed, goods that were damaged while being stored, and so on. The use of warehouse management solutions that are both effective and up to date is an undeniably surefire way to cut down on the number of errors like these. Newer technologies, such as automated picking and packaging systems, voice picking, and many others, are responsible for introducing a number of additional checks at various points throughout the process. This results in better accuracy and a simplification of the operational procedures. Accidents can be reduced to a manageable level by first ensuring that employees in the warehouse have received the appropriate training and then ensuring that the procedures clearly specify where and how products should be handled. Additionally, this will assist in the reduction of the number of accidents that take place.

Since SCM was developed as a strategy for improving the performance of organisations, it has attracted the attention of a significant number of academics, as demonstrated by a comprehensive analysis of the relevant published literature. The findings of this study are significant because they shed light on the various SCM antecedents that influence business success in Malaysia's logistics sector. SCM is now being utilised on a widespread scale by companies all over the world. However, research findings are still mixed regarding the ways in which SCM might assist businesses in accomplishing their goals. At least some of the conversation is centred on the intangible assets held by the organisation, such as trust, and the ways in which these assets contribute to the overall performance of the business. It's possible that a widespread lack of faith in the logistics industry's ability to effectively implement IT solutions is to blame for the problems that have

arisen in the industry in Malaysia.

Several studies discuss supply chain vulnerability, also known as the supply chain decision-making cycle. In this cycle, the leader isn't fully aware of the option that needs to be chosen due to the necessity of supply chain transparency and the impact that supply chain transparency has on prospective actions. This cycle is discussed in several studies. Another study defines supply chain vulnerability as the disparity between supply chain activity equilibrium and productivity when unpredictable and probable events necessitate a response to restore equilibrium. This shocking occurrence in the supply chain may have occurred as a result of an unexpected request, a delay in delivery from the end of the suppliers, or a breakdown in essential production machinery. The term supply chain incorporation is a measurement of how well an organisation works with its partners in its supply chain to ensure the timely, cost-effective, and hassle-free flow of information, goods, money, and services.

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