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Employee Perception of Information Sharing on Supply Chain Performance

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Abstract

The telecommunication industry holds an immense share in Malaysian economic activities. This study aimed to determine the relationship between information sharing and supply chain performance, as well as whether this relationship is mediated by logistics integration. The study was conducted among 361 respondents from 21 Malaysian telecommunication firms in Malaysia by applying a structural equation modelling with SmartPLS. Findings revealed information sharing associated with supply chain performance. Logistics integration mediated the relationship between information sharing and supply chain performance. The study has implications for practitioners in the decision-making process of supply chain procedures in the telecommunications industry.

Keywords: Information sharing; Logistics integration; Telecommunication; Supply Chain Performance

1.0 Introduction

Supply Chain Management (SCM) provides various competitive benefits in today's corporate sector including the communication sector. It is critical to assess Supply Chain Performance (SCP) while monitoring business performance. SCP's long-term goal is to evaluate market share, while its short-term goals include cost-cutting measures. The fast expansion of telecommunications had a profound effect on the development of human life. With the announcements of the 5G special purpose vehicle and the Celcom-Digi merger, the Malaysian telecom market is undergoing enormous transformation. Even though COVID-19 has had a substantial impact on several industries, including the telecommunication sector, the telecommunication industry continues to build its enterprise capabilities in Malaysia, owing to the high level of expectations for the 5G adoption rate and industry growth (Alfie, 2021). Furthermore, with rising competition in the telecommunications business and customer demand for more low-priced products with higher quality service, the telecommunication industry in Malaysia must optimize its SCM.

The overall mobile subscribers in 2020 declined due to lower prepaid and roaming users while data usage increased in the same year driven by large-scale remote working, growth in content streaming, and limited fiber infrastructure in the country but growth in 2021 (Alfie, 2021). Besides the growth in mobile subscriptions, there has also been a rise in mobile connectivity. Data indicates that as of January 2021, Malaysia had 39.99 million mobile connections. Over the period between January 2020 and January 2021, the total count of mobile connections in Malaysia decreased by 72 000. In 2021, the quantity of mobile connections in Malaysia was equal to 122.8

percent of the total population. Since many individuals possess more than one mobile connection, the figures for mobile connections could surpass 100% of the entire population (MCMC, 2021).

Pettersen & Segerstedt (2013) established that there are four high levels of supply chain structure in the telecommunication industry; commencing with suppliers/contractors, trailed by equipment suppliers, service suppliers, and consumers. Every level of the supply chain arrangement functions differently to attain superior organizational performance (Pettersson & Segerstedt, 2013). The equipment suppliers emphasize technology growth and value-added services invention. The service providers are mainly concentrated on network servicing and customer procurement. Various common difficulties are experienced by this sector which includes equipment suppliers continuously searching for original supply sources and growing the width of channels to cater to new demand. These are mainly driven by the desire to lessen expenses and grow market shares. Network integrators and manufacturers are shifting to service sectors by pursuing outline and offering new and inventive services for consumers. This has burdened stakeholders in the supply chain to compose the design, manufacturing, procurement, and logistics to introduce inventive products into the market.

The Malaysian telecommunications sector statistics, which were briefly addressed, reveal that the telecommunications business in Malaysia produces a significant level of financial activities dealing with suppliers. In line with the technological advancements and market globalization, Malaysian telecommunications must improve its internal strategies and operational processes, prioritize customer-centric supply chain management, enhance stakeholder communication, and refine logistical approaches. Not only organize internal information system enhancements need to be made; the global supply chain requires an improvement that extends beyond a company's corporation and includes connectivity between all global supply chain partners since the telecommunications industry is made up of numerous organizations spread across the inventory network. A strong supply chain not only reveals cost-cutting advantages, but also encourages revenue growth. It emphasizes the importance of corporations being increasingly active in the management of their global supply chain in a comparable manner to keep industry developed. This research is being undertaken in response to the knowledge demand on SCM and SCP in the Malaysian telecommunication industry.

2.0 Literature Review

2.1 Information Sharing
Evidence from researchers and practitioners, learning and sharing knowledge play an important role in the supply chain and improve SCM systems. This is the process by which the intended business acquires, integrates, and employs data from internal sectors, as well as important suppliers and clients. The interrelationships among the exchange of information, the acquisition of supply chain knowledge, and the effectiveness of adaptability play a crucial role in the field of production and operations management. According to an empirical inquiry conducted by Huo et al (2021), the impact of information exchange on three aspects of supply chain learning (internal, supplier-related, and customer-related learning) is demonstrated, which in turn enhances the effectiveness of adaptability. Inadequate sharing of information results in ineffectual coordination units within a company (Shukla, 2016). The research's goal is to provide an overview of the effectiveness of SCM information and to enhance an organization's efficiency in the telecommunications sector

Information sharing explains how critical information is conveyed among the supply chain participants such as customer information, goods, and market (Sundram et al., 2011). It is an indispensable measurement in SCM practices. Sezen (2008) examined manufacturing companies in Turkey and identified that information sharing is associated with SCP but with lesser relative effects. According to a study conducted by (Khan & Siddiqui, 2018) among 35 pharmaceutical companies in Pakistan, strategic supplier partnerships and the quality of information sharing have a positive effect on pharmaceutical company performance, whereas the level of information sharing has a negative impact on performance. The result indicates that strategic supplier partnership, level of information sharing, and quality of information sharing significantly correlate with the performance of manufacturing pharmaceutical firms. The current study will prove fruitful for the organization in improving their performance by implementing concepts of SCM within their companies. This viewpoint helps policymakers and management in integrating concepts throughout the company to improve firm performance and achieve a competitive advantage.

2.2 Logistics Integration and Supply Chain Performance
Logistics Integration (LI) is defined as practices and active activities that synchronize the procedure of obtaining material from supplier to the customer through the value stream (Madzimure, 2019). In the telecommunication industry, transportation and LI have interdependence since each logistic activity requires transportation to ensure improved traffic with transportation improvement. Rondinelli and Berry (2000) designated that the constituents of transportation logistics systems encompass water transport, air transport, and land transport. LI is an essential factor in evaluating SCP (Alam, Bagchi, Kim, Mitra & Seabra, 2014) as it is a novel criterion for organizations to assess their performance with suppliers (Ashenbaum, & Maltz, 2017). Research has provided proof that LI influences organizational performance and claimed that supply chain managers perceive that there are overlaps in the roles of purchasing and logistics managers (Lyu & Brennan, 2019; Madzimure, 2019). Although shared responsibility in choosing a supplier to influence logistics collaboration, and relationship history has the greatest influence on logistics performance (Aharonovitz et al., 2018). Logistics and purchasing supervisors significantly impact supplier performance (Ashenbaum & Maltz, 2017). Yuen and Van Thai (2017) also assumed that the development in LI imparts to the surge of operational benefits. Logistics was largely concerned with the flow of finished products and services outbound, with a focus on physical distribution and warehouse management. Logistics, as a management activity, focus on its function in supporting an organization's business plan and providing time and place utility. Because of industrial globalization and

transportation deregulation, logistics has expanded beyond outward flows to include materials management and physical distribution as essential aspects (Hausman et al., 2006).

Next, information sharing is considered a crucial component of supply chain capability. Wu et al. (2016) introduced the concept of data exchange as a representation of supply chain capabilities. The act of supplying and making data accessible to other stakeholders within the supply chain facilitates quicker and more informed business decisions, which ultimately form the basis of competitive advantage. As such, information sharing is described as the factor that mitigates the occurrence of the "bullwhip effect" (Gawankar, Kamble, & Raut, 2017) that lessens the whole cost of the supply chain in converting it to become more effective (Ganesh, Raghunathan, & Rajendran, 2014).

Hence, the hypotheses are as follows:
 I. Hypothesis 1: There is a relationship between information sharing and SCP.
 II. Hypothesis 2: LI mediates the relationship between information sharing and SCP.

Fig 1: Theoretical Framework

3.0 Methodology

In this research, the data collection process involved using questionnaires as the primary tool. The gathered data underwent analysis to meet the research objectives, address research inquiries, and validate the proposed hypotheses. The methodology for determining the sample size was based on criteria outlined by Sekaran and Bougie (2016). These criteria encompassed factors like desired precision level, preferred confidence level, population variability, cost considerations, time constraints, and population size. To select the participants, a simple random sampling technique was employed. Specifically, the study employed this method to choose employees from the telecommunications sector. This approach was chosen to ensure broader applicability of the research findings. The suitability of simple random sampling lies in situations where an accurate and easily obtainable list exists (Saunders, Lewis, and Thornhill, 2016).The study was conducted among 361 respondents from 21 Malaysian telecommunication firms in Malaysia by applying a structural equation modelling with SmartPLS.

4.0 Findings

Cronbach's alpha value for independent dependent variable regarding the information sharing has a value of 0.84 which means 84% of the variance is reliable variance. While, the Cronbach's alpha value for dependent variable of SCP is 0.80, and mediator LI is 0.85. The structural model evaluation was conducted to test the relationship between the variables after the evaluation and the amendments of the validity and the reliability of the measurement model. The results of the structural model allowed the researcher to gauge how well the data sustain a theory or an idea. The guideline established by Hair et al. (2010) listed the five steps performed that need to be conducted which are to examine (1) collinearity issues, (2) path model, (3) coefficient of determination (R^2), (4) effect size (f^2), and (5) mediation effect. The details are presented in subsequent sections. After the results and the model were assessed and presented, the research hypotheses were discussed.

4.1 Loading, Composite Reliability and Average Variance Extracted
As shown in Table 1, the composite reliability coefficient of each latent construct ranged from 0.86 to 0.95, with each exceeding the minimum acceptable level of .70, suggesting adequate internal consistency reliability of the measures used in this study. 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 divulges 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

Information Sharing		
Organization informs its trading partners in advance of changing needs	0.41	Del

Organizations trading partners keep your organization fully informed about issues that affect its business	0.80	0.81
Organization trading partners share business knowledge of core business knowledge with your org	0.58	0.62
Organization and trading partners exchange information that helps establishment of business planning	0.76	0.78
Organization and trading partners exchange formal information sharing about a new product launching	0.68	0.71
Organization and trading partners share information on the forecast of customer demand	0.80	0.81
Cronbach's Alpha	*0.81*	*0.84*
Composite Reliability	*0.87*	*0.88*
Average Variance Extracted (AVE)	*0.49*	*0.55*
Logistics Integration		
Inter organization logistics activities are closely coordinated	0.87	0.87
Logistics activities are well integrated with supplier logistics activities	0.93	0.94
Logistics integration is characterized by excellent distribution, transportation and warehouse activities	0.90	0.91
The inbound and outbound distribution with a supplier is well integrated	0.91	0.92
Seamless integration of logistics activities with key supplier	-0.25	Del
Cronbach's Alpha	*0.78*	*0.93*
Composite Reliability	*0.87*	*0.95*
Average Variance Extracted (AVE)	*0.67*	*0.83*
Supply Chain Performance		
More accurate costing	0.14	Del
Increased coordination between department	0.72	0.71
Increase in coordination with supplier	0.75	N.C
Increase in coordination with customer	0.90	0.89
Increase in sales	0.83	0.84
Cronbach's Alpha	*0.60*	*0.76*
Composite Reliability	*0.73*	*0.86*
Average Variance Extracted (AVE)	*0.41*	*0.67*

4.2 Collinearity Test

Table 2 Collinearity test

	Logistics Integration	SCP
Information Sharing	1.325	1.987
Logistics Integration		1.719
Strategic Supplier Partnership	1.062	1.081

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 three independent variables of Information sharing ($\beta = 0.42$, $p < 0.05$). Thus, H1 and H2 were supported while the regression weight (β) for mediator (Logistic Integration) and SCP was ($\beta = 0.56$, $p < 0.05$), which was reported to be significant.

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

Hypothesis	*B*	S.E	T.S	P	Confidence intervals	
					Low	Up
Information Sharing -> SCP	0.42	0.02	21.06	0.00	0.38	0.46
Information Sharing -> Logistics Integration	0.62	0.04	13.99	0.00	0.54	0.70
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. (2010), the coefficient of determination (R^2) was measured to assess the model's predictive accuracy. Table 3 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., 2014). This is done to reveal which exogenous variables have a practical influence on the endogenous variables. Hair et al. (2014) highlighted the

values of 0.499, 1.495, 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)
Information Sharing	0.499	1.495
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			
Information Sharing -> SCP	0.35	16.89	0.00
Total (direct) effect on SCP			
Information Sharing -> SCP	0.22	22.73	0.00
Total (direct) effect on LI			
Information Sharing -> Logistics Integration	0.62	15.25	0.00
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
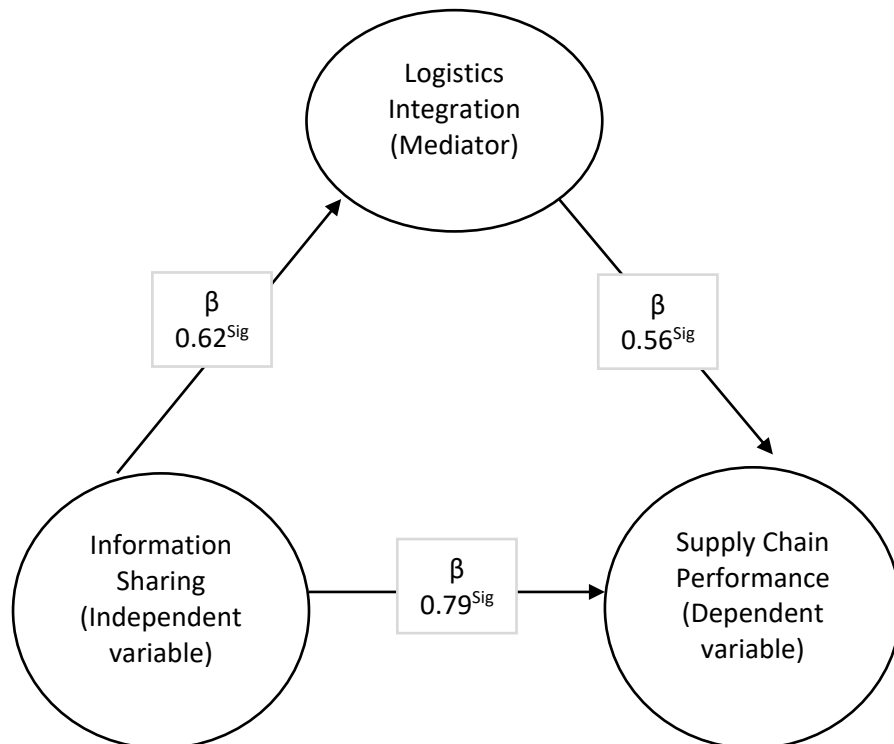
Step1: The effect of Information Sharing (Independent variable) on Logistics Integration (mediator) was significant (β 0.62; p < 0.05)
Step2: The effect of Logistics Integration (mediator) on SCP (Dependent variable) was significant (β 0.56; p < 0.05)
Step3: The effect of Information Sharing (Independent variable) on SCP (Dependent variable) was significant (β 0.35; p < 0.05)

Since all three criteria were met it concluded there was a full mediation of Logistics integration mediates on the relationship between information sharing and SCP and hence H2 was supported.

4.7 Summary of hypotheses result.

Table 7 Summary of Hypotheses Findings

Hypotheses	Statements	Findings
H1	There is a relationship between information sharing and supply chain performance	*Supported*
H2	Logistics integration relationship mediates the relationship between information sharing and supply chain performance	*Supported*

5.0 Discussion

The relationship between information sharing and strategic supplier performance was significant and positive. Hence, hypothesis H1 was supported. The benefits of sharing and integrating information in supply chain management have been thoroughly documented in the literature. This finding is positive when compared to Sener et al, (2021), because it suggests that information sharing is a suitable application area to benefit from the use of data-mining technologies for decision-making and enhancing supplier performance. This conclusion is consistent with their discovery that information sharing had a somewhat positive and substantial impact on supplier trust. Similarly, another study discovered that information sharing mediates the association between information sharing and relationship satisfaction to some extent (Huo et al., 2017). The advantage of information sharing and integration in supply chain management has been frequently reported in the literature. It is encouraging to compare this finding with that found by (Sener et al., 2021) who show that information sharing is an ideal application area to benefit from the use of data-mining tools for decision-making and improving supplier performance. The mediating effect of logistics integration in the relationship between information sharing and supply chain performance was found to be significant and positive. Hence, hypothesis H2 was supported. The results recommend that information sharing improves supply chain performance if the logistics sector performs better integration. Logistics integration and information sharing demonstrate how critical information is shared among the supply chain members pertaining to customer information, material logistic practices, and operational activities that coordinate the flow of material from supplier to the customer throughout the value stream. According to Sundram et al., (2020), information sharing requires firms to exchange strategic information of the supply chain. The strategic supply chain information provides leverages to the supply chain partners in terms of making strategic decisions in their operations and logistics integration.

6.0 Conclusion & Recommendations

The study established that by sharing information with suppliers, supply chain performance improved through logistics integration. The study has implications for practitioners in the decision-making process of SCM procedures, particularly in the telecommunications industry. Other case studies or diverse industries can adopt and replicate the framework of this study to facilitate comparisons with the telecommunication sector.

Acknowledgement

Paper Contribution to Related Field of Study

The results of the study highlighted sharing information as one of the significant factors influencing logistics integration and SCP. These findings proved that information sharing, and logistics integration indeed contributes to the SCP in Malaysia's telecommunication industry. It also contributes to the theoretical framework and deeper understanding of the SCP.

References
Aharonovitz, M. C. S., Vidal Vieira, J. G., & Suyama, S. S. (2018). How logistics performance is affected by supply chain relationships. *The international journal of logistics management*, *29*(1), 284-307.

Alam, A., K. Bagchi, P., Kim, B., Mitra, S., & Seabra, F. (2014). The mediating effect of logistics integration on supply chain performance: a multi-country study. *The International Journal of Logistics Management*, *25*(3), 553–580.

Alfie, A. (2021). *No TitleMalaysian Telecom Update Q1 2021*. GlobalDATA.IT. https://doi.org/https://itcblogs.currentanalysis.com/2021/04/29/malaysian-telecom-update-q1-2021/

Ashenbaum, B., & Maltz, A. (2017). Purchasing-logistics integration and supplier performance: an information-processing view. *The International Journal of Logistics*

Management, *28*(2), 379–397.

Falk, R. F., & Miller, N. B. (1992). *A primer for soft modeling*. University of Akron Press.

Ganesh, M., Raghunathan, S., & Rajendran, C. (2014). The value of information sharing in a multi-product, multi-level supply chain: Impact of product substitution, demand correlation, and partial information sharing. *Decision Support Systems*, *58*, 79-94.

Gawankar, S. A., Kamble, S., & Raut, R. (2017). An investigation of the relationship between supply chain management practices (SCMP) on supply chain performance measurement (SCPM) of Indian retail chain using SEM. *Benchmarking: An International Journal*, *24*(1), 257-295.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson Prentice Hall.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. SAGE Publications, Inc.

Hausman, A., Johnston, W. J., Gundlach, G. T., Bolumole, Y. A., Eltantawy, R. A., & Frankel, R. (2006). The changing landscape of supply chain management, marketing channels of distribution, logistics and purchasing. *Journal of Business & Industrial Marketing*.

Huo, B., Haq, M. Z. U., & Gu, M. (2021). The impact of information sharing on supply chain learning and flexibility performance. *International Journal of Production Research*, *59*(5), 1411–1434.

Huo, B., Wang, Q., Zhao, X., & Hua, Z. (2017). Barriers to third-party logistics integration: empirical evidence from China. *Industrial Management & Data Systems*, *117*(8), 1738–1760.

Khan, A., & Siddiqui, D. A. (2018). Information sharing and strategic supplier partnership in supply chain management: A study on pharmaceutical companies of Pakistan. *Asian Business Review*, *8*(3), 117–124.

Lyu, G., & Brennan, R. W. (2019). Towards IEC 61499 based distributed intelligent automation: Design and computing perspectives. *IEEE International Conference on Industrial Informatics (INDIN)*, *2019-July*(Section II), 160–163. https://doi.org/10.1109/INDIN41052.2019.897215

MCMC. (2017). *Industry Performance Report for 2021* https://www.mcmc.gov.my/resources/industry/industry-performance-report

Madzimure, J. (2019). The influence of strategic networks and logistics integration on firm performance among small and medium enterprises. *The Southern African Journal of Entrepreneurship and Small Business Management*, *11*(1), 1–7.

Pettersson, A. I., & Segerstedt, A. (2013). *To Evaluate Cost Savings in a Supply Chain : Two Examples from Ericsson in the Telecom Industry*. *6*(3), 94–102.

Rondinelli, D., & Berry, M. (2000). *and the Environment : Managing Interactions in a Global Economy*. *18*(4), 398–410.

Saunders, M. N., Lewis, P., Thornhill, A., & Bristow, A. (2015). Understanding research philosophy and approaches to theory development.

Sener, A., Barut, M., Dag, A., & Yildirim, M. B. (2021). Impact of commitment, information sharing, and information usage on supplier performance: a Bayesian belief network approach. *Annals of Operations Research*, *303*(1), 125–158.

Sezen, B. (2008). Relative effects of design, integration and information sharing on supply chain performance. *Supply Chain Management*, *13*(3), 233–240. https://doi.org/10.1108/13598540810871271

Sundram, V. P. K., Ibrahim, A. R., & Govindaraju, V. G. R. G. R. C. (2011). Supply chain management practices in the electronics industry in Malaysia: Consequences for supply chain performance. *Benchmarking*, *18*(6), 834–855.

Sundram, V. P. K., Chhetri, P., & Bahrin, A. S. (2020). The consequences of information technology, information sharing and supply chain integration, towards supply chain performance and firm performance. *Journal of International Logistics and Trade*, *18*(1), 15–31.

Wu, I.-L., Chuang, C.-H., & Hsu, C.-H. (2016). Information sharing and collaborative behaviors in enabling supply chain performance: A social exchange perspective. *International Journal of Production Economics*, *148*(0), 122–132. https://doi.org/http://dx.doi.org/10.1016/j.ijpe.2013.09.016

Yuen, K. F., & Thai, V. V. (2017). The influence of supply chain integration on operational performance: A comparison between product and service supply chains. *The International Journal of Logistics Management*, *28*(2), 444-463.

Zhao, X., Lynch Jr, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, *37*(2), 197–206.