

Effect of Supply Chain Agility on Supply Chain Performance of Manufacturing Firms in Mombasa County, Kenya

William Wambua Ali*

School of Business, Technical University of Mombasa

**Corresponding Author*

Dr. Mary Ibua

School of Business, Technical University of Mombasa

Dr. Fred Ongisa

Kenya Institute of Supplies Examination Board (KISEB)

Abstract

Given the unpredictable fluctuations prevalent across various business sectors, the imperative of supply chain agility has emerged. Companies must harness agility within their supply chain domain to enhance operational performance and meet the dynamic demands of the market. This research, conducted within the manufacturing sector of Mombasa County, endeavors to ascertain the influence of supply chain agility on organizational performance. The investigation was guided by specific objectives, namely, examining the impact of procurement range and evaluating the effect of sourcing adaptability in agile supply chains on the performance of the manufacturing industry. The theoretical frameworks underpinning this study encompass the Resource-Based View theory and Contingency theory. The research design employed was descriptive, and the population under consideration is the manufacturing firms within Mombasa County, with a focus on senior personnel engaged in the supply chain systems. The study's population is 100 manufacturing firms, and a census approach was adopted, involving 100 supply chain managers as the targeted audience. Challenges encountered during the research process include reluctance among respondents to participate due to concerns about the potential exposure of confidential data to competitors, time constraints faced by respondents, and a cautious approach when interacting with the broader public. Survey results indicate that respondents, on average, agree that procurement range significantly reduces manufacturing lead time with a mean of 3.84. Additionally, a substantial majority (80%) strongly agrees that sourcing adaptability enhances flexibility within supplier contracts with a mean of 4.7. Conclusively, it was determined that procurement range positively impacts customer service, boosts customization levels, and improves delivery reliability. Sourcing adaptability, on the other hand, contributes to high flexibility in supplier contracts, stimulates the frequency of new products, and facilitates the organization's ability to sustain long-term relationships with suppliers. In light of these findings, the study recommends that procurement firms within supply chain networks focus on developing procurement range and sourcing adaptability.

Key Words: Supply chain management, Supply chain Agility, Organizational performance, Procurement range, Sourcing adaptability, Manufacturing firms

Doi: 10.61250/ssmj/v1.i2.4

1. Introduction

The capacity of a company to achieve agility is pivotal for thriving in volatile environments. In today's globalized world, the manufacturing industry must develop strategies to respond swiftly to daily developments (Mali & Shrimali, 2019). Responding quickly and flexibly to changes in demand is referred to as supply chain agility, and businesses must explore this concept to be compete successfully in an ever-changing supply chain landscape. It is important to view agile supply chains as a tool for gaining control within the organization, alongside other necessary measures (Osman, Sarip & Arif, 2017).

According to Chan and Moon (2017), supply chain agility in Europe possesses a wide range of properties, with flexibility as a viable starting point for companies to embark on their agility journey. Procurement, manufacturing, and logistics flexibility in the value chain favor the development of value-adding systems to meet rapidly changing market expectations. Supply chain agility is crucial for addressing responsiveness issues in fast-changing environments, particularly those with a high degree of customization (Newaz, Rahman & Taha, 2020).

Organizations must proactively respond to external developments and challenges to meet evolving customer needs. Standard approaches are no longer sufficient, and the advantages of cost and distinctiveness have diminished (Meyer, Niemann & Peckover, 2017). Businesses need to offer more than just cost savings and differentiation. While leanness and agility may seem incompatible, they can be managed to realize the benefits of both concepts, with internal value chain adjustments as a starting point for providing a proactive response (Meyer, Niemann & Peckover, 2017).

1.2 Statement of the Problem

The future of all businesses hinges on agile supply chains. A company's ability to cultivate agility is imperative for its survival in turbulent environments. Nevertheless, many corporations grapple with supply crises as they struggle to address unexpected market fluctuations in relation to demand. This is often due to a lack of complete understanding of the concept of supply chain agility (Notteboom, Pallis & Rodrigue, 2021). Agility within a supply chain is of paramount importance for addressing responsiveness challenges and enhancing corporate performance, especially in environments marked by a high degree of customization (Dickson, 2018).

As per studies conducted by Patel and Sambasivan (2021), agility fundamentally differs from lean, which is primarily associated with cost efficiency, mainly due to its emphasis on client effectiveness. Yet, there exists a significant knowledge gap that calls for further investigation into the influence of agile supply chains on organizational success (Dubey, Bryde, Dwivedi, Graham, & Foropon, 2021). It is recommended that organizations adopt agile practices, especially when operating in highly uncertain contexts (McMackin & Heffernan, 2021). Agility is inherently intertwined with the success of strategic supply chain management (Jamjumrus & Sriragool, 2019). According to Blome, Papadopoulos, and Childe

(2018), Although distribution network agility and adaptability possess distinctive attributes, not much has been established regarding their performance and the context in which they function.

A particular knowledge gap that remains unaddressed is the lack of empirical data regarding how supply chain agility influences corporate performance. An essential area in which research is lacking involves the interpersonal and interactive precursors of supply chain agility (Ayoub & Abdallah, 2019). Meyer, Niemann, Peckover, and Karlheinz (2017) have observed that the lean approach, whether in conflict or harmony with agility, does not seem to be practically viable, especially in volatile situations.

1.3 Objective of the Study

General Objective

To examine the effect of supply chain agility on the performance of manufacturing firms in Mombasa County, Kenya.

Specific Objectives

- i. To examine the effect of procurement, range on performance of manufacturing industry.
- ii. To determine the effect of sourcing adaptability on performance of manufacturing industry.

1.4 Hypothesis of the Study

- H₀₁ Procurement range has no significant effect on performance of manufacturing industry.
- H₀₂ Sourcing adaptability has no significant effect on performance of manufacturing industry

2. Empirical literature review

2.1 Resource based view theory and Procurement range

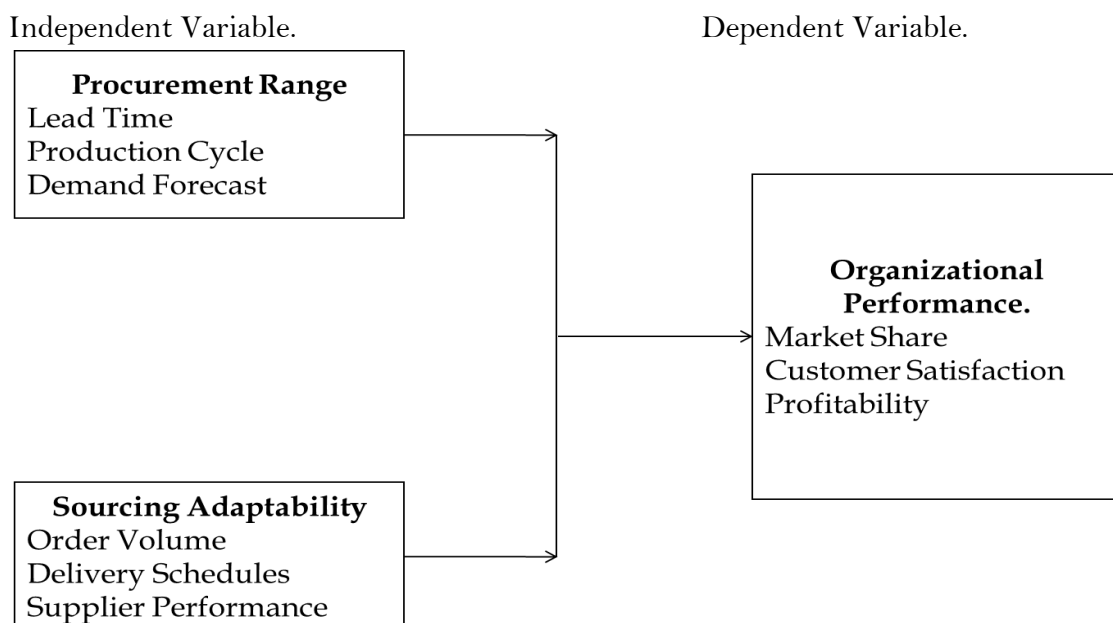
The primary claim of this theory, despite a firm's well-defined goals, how well the quest is conducted is frequently limited by available resources. Hence, it is the desire for every manufacturer to edge out other competing ventures within its scope in effective ease of sourcing raw material, manufacturing technology and securing skilled human resource. On the hand, procurement range in supply chain management encompasses a broad variety of activities involved in planning, regulating, demand forecasting and implementing a product flow. Furthermore, agility is a method of operation that aims to increase speed and adaptability in the supply chain. It is the process involved in the production and marketing of a product, from the supply of raw materials by the supplier to the producer to the final delivery to the end user. All organizations have supply chains, to varied degrees, based on their size

and the sort of product they make. The resource-based perspective allows supply chain strategists to evaluate elements to deploy to gain a competitive advantage (Mishra & Yadav, 2021). Manufacturers use resources in procurement range to determine the strategy that best exploits internal resources and competencies regarding external opportunities (Alnuaimi et al., 2021).

2.2 Contingency theory and Sourcing adaptability

According to adherents of the Contingency theory, organizational efficiency is the result of matching organizational qualities, such as structure, to conditions that mirror the organization's environment. In the study by Jang & Jeong, 2022, the environment and the size are two examples of this contingencies. Whereas, sourcing adaptability is the ability of the procurement function to exploit different options as customers' requirements change (Meyer, Niemann & Peckover, 2017). Adaptability in sourcing leads to flexibility; organizations are able to restructure and optimize resources, allowing them become much more innovative while focusing on what they do best. Access to trained employees, economies of scale in technical and human resources, mitigating risk of technological obsolescence, as well as enhanced exposure to vital big data technology are all examples of sourcing adaptability. The contingency approach holds that organizational environment and structure have an impact on performance (Yang & Jiang, 2023). Suppliers must be able to adapt their logistics to short-term changes in delivery volume and product mix, and distance can play a role in this.

2.3 Conceptual Framework



2.4 Empirical Review

Empirically, Manufacturers use resources in procurement range to determine the strategy that best exploits internal resources and competencies regarding external opportunities (Alnuaimi et al., 2021). According to Dickson., (2018), procurement range is the method of locating, negotiating, and acquiring services and goods that come with numerous typical market possibilities. Identifying your finest suppliers as well as negotiating the best contracts streamlines the procurement process and supply chain, resulting in lower costs and a faster production cycle. It necessitates the capacity of providing the necessary goods and services in light of fluctuating demand, thereby supporting the growth and enhancement of a firms' distribution channel agility.

Longer lead times necessitate additional inventory as well as transportation stock. Elongated lead periods further limit the distribution network capacity to adjust to fluctuating demand, variability, or even uncertainty (Katsaliaki, Galetsi & Kumar., 2021). Extended lead periods make delivery more uncertain, forcing firms to arrange orders significantly based on demand estimates.

Meyer, Niemann & Peckover.,2017, in their study defined sourcing adaptability as the ability of the procurement function to exploit different options as customers' requirements change. Strategic sourcing may help firms save money by pooling their buying power in order to achieve the lowest overall cost associated with ownership to decrease risk in the supply chain (Lichtenthaler, 2020). Adaptability in sourcing leads to flexibility; organizations are able to restructure and optimize resources, allowing them become much more innovative while focusing on what they do best.

According to Ombati (2018), one of the most often adopted methods in this era of globalization is sourcing adaptability. Aside from the desire to enhance quality of the product and level of service, distributing procurement volume among various vendor's increases provider competitiveness. Sustained competition among vendors not only reduces reliance on a single provider, but also keeps the costs of goods and services under control. The two most important factors influencing sourcing adaptability are resources and capability. Capability is generated from the entire company's resources, which are organized to meet the goals of the organization's activities (Obydenov, 2021).

In research by Li et al (2020), he concludes that in highly centralized organization with a smooth flow information system, it is essential for executors to have the capacity to make decisions and carry out tasks through sourcing adaptability of agile supply chains on manufacturing industry performance.

3. Methodology

A descriptive research design was used to assess whether agility in the distribution channels affects performance of the organization. Descriptive design was utilized to explain the nature and influence of agility in supply chain performance on organisations, using a

manufacturing industry case study. A descriptive study, according to [Johnson and Froehlich \(2018\)](#), is a design method for determining the current condition of a phenomenon and how much it links to factors or circumstances in a scenario. The study's target audience was 100 manufacturing firms supply chain and procurement managers, who work on the supply chain system for manufacturing organizations in Mombasa County.

In the study, the census approach was utilized to count every item in the population. A census is a description of a population with random variances ([Kitheka, 2018](#)). Each firm's supply chain or procurement manager was given a questionnaire, for a total of 100. The fact that supply chain managers form a component of the senior management team responsible for making critical decisions that define business strategy and relationships with partners and customers influences their choice. Because of their position, they are judged competent enough, and their comments may be depended on in this study.

4. Results and discussion

4.1 Descriptive and Correlational Analysis

Procurement range in agile supply chains has an influence on organization performance, an observation that proved the importance of procurement range which influences organization performance. Regression and correlation analysis revealed that procurement range was significantly and positively related to organization performance. As a result, the null hypothesis was rejected. These findings are similar to that of [Chan and Moon \(2017\)](#) that investigated the effects of strategic and manufacturing flexibilities and supply chain agility on firm performance in the fashion industry. They established that supply chain agility had a 75% significance influence on performance in the fashion industry. From the correlation analysis, it was found that there exists a strongest correlation between organization performance and procurement range as $r=.521$. The findings showed that procurement range lowers manufacturing lead times by a mean of 3.84. With a mean of 4.71 and a standard deviation of 0.618, the majority of respondents strongly agreed that the procurement range boosts the amount of customization.

Sourcing adaptability in agile supply chains has an influence on organization performance. These observations proved the importance of sourcing adaptability in agile supply chains which influences organization performance. From the correlation analysis, it was found that there exists a strongest correlation between organization performance and sourcing adaptability as $r=.715$. Sourcing adaptability leads to high flexibility within supplier contracts, compared to those who concurred 20% with a mean of 4.7. Research findings showed that most respondents strongly agreed that 56% that sourcing adaptability leads to broad range of possible order sizes from suppliers with a mean of 4.4. 67% of the respondents stated that the sourcing adaptability leads to frequent change of volume allocation among existing suppliers compared to those who concurred 22% with a mean of 4.1. The findings showed that response from research with a mean of 4.6, that sourcing adaptability enhances

change of delivery times for orders placed with suppliers on a short notice and Sourcing adaptability enhances firm's ability to sustain suppliers on a long-term basis.

Table 1: Pearson correlation analysis
Showing Pearson Correlation analysis on Procurement Range, Sourcing Adaptability, Manufacturing Adaptability and Logistic Adaptability towards Organization Performance

	Organization Performance	Procurement Range	Sourcing Adaptability	Manufacturing Adaptability	Logistic Adaptability
Organization Performance	1				
Procurement Range	0.521	1			
Sourcing Adaptability	0.715*	.601	1		
Manufacturing Performance	0.629	.539	.320	1	
Logistic Adaptability	0.327	.164	.117	.327*	1

4.2 Diagnostic Tests

To ensure the results' trustworthiness, we assessed multicollinearity, stationarity, heteroscedasticity, autocorrelation, and the Hausman test to determine the optimal model for estimating between fixed and random effects models. In testing for multicollinearity, we used the variance inflation factor (VIF) tests, which revealed that VIF was less than 5, and in the spirit of [Montgomery \(2011\)](#) and [Gujarati \(2003\)](#), who stated that VIF values should not be greater than 5 or 10, we concluded that the model did not suffer from multicollinearity. The Im-Persaran-Shin (IPS) test, which allows for heterogeneous coefficients, was employed to find the unit root. The Im-Persaran-Shin (IPS) test results revealed that the variables were non-stationary at the level but stationary at the level, indicating that the model included variables at the first difference. To evaluate the spherical disturbances assumption, we utilized the Breusch-Pagan LM test of independence with the null hypothesis of homoscedasticity or poolability ([Gujarati and Wooldridge, 2003](#)).

The Breusch-Pagan LM test, with a (10) = 8.004, is statistically insignificant (p-value = 0.6285) at all levels of significance; thus, in agreement with [Gujarati \(2003\)](#) and [Wooldridge \(2003\)](#), we conclude that the spherical disturbance assumption is met, as the Breusch-Pagan LM test confirms the uncorrelated cross-firm residuals. Furthermore, use the [Wooldridge \(2002\)](#) serial correlation test, which is an F-test with the null hypothesis of no first-order autocorrelation. At the 0.05 threshold of significance, the F Critical was 4.109, however the F calculated was 11.351, indicating that the F calculated was more than the F critical. As a

result, the overall model proved significant in depicting the link between the dependent and independent variables. In deciding whether to use fixed or random effects models, we used the Hausman test, which returned a 1.36 with a p-value of 0.84, which was more than 0.05, hence this study used the random effects regression model.

4.3 Regression on the effect of procurement range & sourcing adaptability

The relationship between the dependent and independent variables was tested for significance at the 1.01 level, and the R-Square (coefficient of determination) was used to measure the proportion of changes in organizational performance explained by the independent variables. The regression model's significance was determined using Analysis of Variance (ANOVA). the significance value was $p=0.012$, demonstrating the model was significantly accurate for forecasting organizational performance using the variables chosen, namely procurement range and sourcing adaptability. At the 0.05 threshold of significance, the F Critical was 4.109, however the F calculated was 11.351, indicating that the F calculated was more than the F critical. As a result, the overall model proved significant in depicting the link between the dependent and independent variables.

Table 2: Regression Coefficients

Coefficients ^a					
Model	Standardized Coefficients		Unstandardized Coefficients	T	Sig.
	B	Std. Error Beta			
1 (Constant)	.5	.501		0.5	.001
Procurement Range	.430	.127	.098	.498	.003
Sourcing Adaptability	.370	.237	.094	.326	.000

Dependent Variable: Organization Performance

The coefficients shown in Table above provide an answer to the model of regression that links both independent and dependent variables. The degree of relevance of the coefficients is determined at the 0.01 level of significance. Table shows that the significance value for each variable was less than 0.05, suggesting that the results were significant. Furthermore, each factor in the table had a positive coefficient, showing that the dependent and independent variables had a positive connection. Based on these coefficients, the regression model is as follows: Organisation Performance (OP): $0.5 \beta_0 + 0.430 PR_1 + 0.370 SA_2 + \epsilon$.

β_0 : Constant

PR_1 : Procurement Range

SA_2 : Sourcing Adaptability

4.4 Discussion of Findings

Descriptive statistics revealed that, procurement range in agile supply chains has an influence on organization performance, an observation that proved the importance of procurement range which influences organization performance. Regression and correlation analysis revealed that procurement range was significantly and positively related to organization success. This led to the rejection of the null hypothesis (H01). According to the

study's descriptive results, most of the participants strongly agreed that procurement range decreases production lead times. A majority of the respondents also indicated that procurement range reduces product development cycle time.

Descriptive statistics revealed that, sourcing adaptability in agile supply chains has an influence on organization performance. These observations proved the importance of sourcing adaptability in agile supply chains which influences performance. The ANOVA findings revealed a substantial influence of sourcing adaptability on Kenyan manufacturers' organizational success, with a F statistic of 11.351 and a p-value of <0.05 . The research also rejected null hypothesis one (H02), demonstrating that sourcing adaptability has a significant positive link with the success of Kenyan manufacturing enterprises. The findings of the descriptive study showed that most respondents strongly agreed that sourcing adaptability leads to high flexibility within supplier contracts, compared to those who concurred. The findings of the study also revealed that the majority of the participants strongly concurred that sourcing flexibility results in a wide variety of feasible order sizes from suppliers.

5. Conclusions

The research concluded that procurement range lowers manufacturing lead time while increasing customer service and improving delivery dependability. Procurement range also increases the frequency of new product development since sourcing flexibility improves the turnaround time for orders made with suppliers on relatively short notice while improving the firm's capacity to sustain suppliers over a steady basis.

Develop strategies to improve procurement range to improve the performance of manufacturing industry and their suppliers to collaborate with manufacturing, building capacity, order cycle duration reduction, training and empowerment, and on-time product delivery aid manufacturing firms on risk management, which will assist the organization in identifying risks, preventing risks, and implementing corrective measures in distribution channel agility on the success of industrial sector in Kenya. Adopt sourcing adaptability to capitalize on economies of scale in agile supply chains on the performance of manufacturing firms by identifying the appropriate suppliers who can supply the required quality at a cost that allows you to earn the required profit. The firms also improve on developing trust and long-term relationships with suppliers to results in less inventory, greater quality, and reduced prices in supply chain process.

Limitations and Future Aspects

A number of participants expressed concern that the information might reach the rivals during the research, making sharing of certain critical information problematic. The responders' busy schedules also posed a barrier, as did their desire to protect the organization's reputation owing to lawful and moral responsibilities when engaging with the wider public. Future research may focus on supply chain agility and success across various sectors. Furthermore, this study concentrated on two supply chain agility solutions namely;

manufacturing adaptability and logistic adaptability, which constituted 73% of the variance in the dependent variable. Future research might look into various techniques for determining the remaining 27%. Thus, future research can take into account additional moderators such as information, communication, and technology, as well as the legal environment and government control.

Conflict of Interest: *The authors clarifies that the research was not exposed to any form of conflict of interest.*

Funding: *The authors assert that he did not receive any funding from any institution*

References

- AlNuaimi, B. K., Khan, M., & Ajmal, M. M. (2021). The role of big data analytics capabilities in greening e-procurement: A higher order PLS-SEM analysis. *Technological Forecasting and Social Change*, 169, 120808.
- Ayoub, H. F., & Abdallah, A. B. (2019). The effect of supply chain agility on export performance: The mediating roles of supply chain responsiveness and innovativeness. *Journal of Manufacturing Technology Management*, 30(5), 821-839.
- Blome, C., Papadopoulos, T., & Childe, S. J. (2018). Supply Chain Agility, Adaptability and Alignment: empirical evidence from the Indian Auto Components Industry. *International Journal of Operations & Production Management*.
- Chan, T., & Moon, K. (2017). The Effects of Strategic and Manufacturing Flexibilities and Supply Chain Agility on Firm Performance in the Fashion Industry. *European Journal of Operational Research*, 259(2), 486-499.
- Dickson, A. E. (2018). Theoretical and Conceptual Framework: Mandatory Ingredients of a Quality Research. *International Journal Of Scientific Research*.
- Dubey, R., Bryde, D. J., Foropon, C., Tiwari, M., Dwivedi, Y., & Schiffing, S. (2021). An Investigation of Information Alignment and Collaboration as Complements to Supply Chain Agility in Humanitarian Supply Chain. *International Journal of Production Research*, 59(5), 1586-1605.
- Jamjumrus, T., & Sriragool, N. (2019). Investigating the Impact of Supply Chain Agility, Government Regulations and Supply Chain Efficiency on Business Performance: Mediating Role of Cost Leadership. *Int. J Sup. Chain. Mgt Vol*, 8(4), 399.
- Johnson, R. B., & Froehlich, D. E. (2018). Combining Multiple Purposes of Mixing Within A Mixed Methods Research Design. *International Journal of Multiple Research Approaches*, 10(1), 271-282.
- Katsaliaki, K., Galetsi, P., & Kumar, S. (2022). Supply chain disruptions and resilience: A major review and future research agenda. *Annals of Operations Research*, 1-38.

- Kitheka, S. S. (2018). Influence of Sourcing Ethics on Procurement Performance of State Corporations in Kenya (Doctoral dissertation).
- Li, J., Maiti, A., Springer, M., & Gray, T. (2020). Block chain for Supply Chain Quality Management: Challenges and Opportunities in Context of Open Manufacturing and Industrial Internet of Things. *International Journal of Computer Integrated Manufacturing*, 33(12), 1321–1355.
- Lichtenthaler, U. (2020). Agile Innovation: The complementarity of Design Thinking and Lean Startup. *International Journal of Service Science, Management, Engineering, and Technology (IJSSMET)*, 11(1), 157–167.
- Mali, C., & Shrimali, P. (2019). Influence of Information and Communication Technology on Telecommunication Industries. In *Computing and Network Sustainability* (pp. 477–483). Springer, Singapore.
- McMackin, J., & Heffernan, M. (2021). Agile for HR: fine in practice, but will it work in theory?. *Human Resource Management Review*, 31(4), 100791.
- Meyer, A., Niemann, W., & Peckover, K. (2017). Supply Chain Agility: A Conceptual Framework Towards Leagility.
- Mishra, A. N., & Pani, A. K. (2020). Business Value Appropriation Roadmap for Artificial Intelligence. *VINE Journal of Information and Knowledge Management Systems*.
- Montgomery, S. E. (2011). Quantitative vs. qualitative—do different research methods give us consistent information about our users and their library space needs?. *Library and Information Research*, 35(111), 73–86.
- Newaz, S., Rahman, K., & Taha, Z. (2020). Supply Chain Integration and its Impact on Supply Chain Agility and Organizational Flexibility in Manufacturing Firms. *International Journal of Emerging Markets*.
- Notteboom, T., Pallis, T., & Rodrigue, J. P. (2021). Disruptions and Resilience in Global Container Shipping and Ports: The COVID-19 Pandemic Versus the 2008–2009 Financial Crisis. *Maritime Economics & Logistics*, 23(2), 179–210.
- Obydenov, A. (2021, March). Parametric strategic management & business agility. In 2021 10th International Conference on Industrial Technology and Management (ICITM) (pp. 67–72). IEEE.
- Ombati, O. T. (2018). Stakeholder Exposure and Sustainable Supply Chain Management Practices in Safaricom, Kenya. *American Journal of Industrial and Business Management*, 8(5), 1139–1156.
- Osman, O. H., Sarip, A., & Arif, L. S. M. (2017). What Role Does Continuance Commitment Play in The Relationship Between Affective Commitment and Organizational Citizenship Behaviour? Case Study Somali Telecommunication Industry Players. *Sains Humanika*, 9(1–3).

- Patel, B. S., & Sambasivan, M. (2021). A Systematic Review of the Literature on Supply Chain Agility. *Management Research Review*.
- Yang, Y., & Jiang, Y. (2023). Buyer-supplier CSR alignment and firm performance: A contingency theory perspective. *Journal of Business Research*, 154, 113340.