International Journal of Management Science and Business Administration

Volume 8, Issue 5, July 2022, Pages 66-74
DOI: 10.18775/ijmsba.1849-5664-5419.2014.85.1006
URL: https://doi.org/10.18775/ijmsba.1849-5664-5419.2014.85.1006

Moderating Effect of Supply Chain Configuration on the Relationship between Dynamic Supply Chain Capabilities and Resilience in the Kenyan Retail Sector in Kenya

Desmond Mwangi Wairimu[1], Dennis Chege[1], Samuel Muli[1], Jackson Ndolo[2]
[1] Department of Procurement and Logistics, Jomo Kenyatta University of Agriculture and Technology, Kenya
[2] Department of Procurement and Logistics, Kenya College of Accountancy University, Kenya

Abstract: This article aims to analyze the moderating effect of supply chain configuration on the relationship between dynamic supply chain capabilities and resilience in the retail sector in Kenya. We used an ex-post facto research design. The study used a stratified random sampling technique to select a sample size of 324 respondents from a population of 3200 employees working in retail chains in Nairobi City County. Further, the study used questionnaires as primary data collection instruments. Data analysis was done using both descriptive statistics and inferential statistics. The study rejected the null hypothesis that supply chain configuration does not moderate the relationship between dynamic supply chain capabilities and resilience in the retail sector. From the analysed data, the moderating effect of SCC had a reducing impact on the relationship between dynamic SC capabilities and resilience in the retail industry. In this regard, the study makes some substantive recommendations; that retail chains should re-evaluate their suppliers upstream and engage in objective supplier base reduction and rationalization to reconfigure their retail chains.

Keywords: Supply Chain Configuration, Dynamic Supply Chain Capabilities, Resilience, Retail Sector

1. Introduction

Extant literature has exemplified the moderating role of supply chain configuration on resilience; For instance, (Chandra and Grabis, 2016) underscores the importance of configurable supply chains to enable retail outlets to adapt to their environment in the context of supply and demand fluctuations. It is against this brief outline that the study aims at developing and testing hypotheses on the relationship between dynamic SC capabilities and resilience in the retail sector in Kenya.

The retail sector ranks the 5th most significant contributor to the country's GDP and ranks the third most important contributor to private-sector employment; the industry employs approximately 238 500 Kenyans (Cyntonn 2018). The sector has recorded a growth rate of 30% five years in a row from 2014-to 2018. The expansion is attributable to an array of factors, such as an increased rate of urbanization, a growing middle class with a dynamic lifestyle, and liberalization of trade that has precipitated cutthroat competition in the sector (Chesula and Nkobe, 2018). According to (Cytonn, 2018), Kenya has the fastest growing retail market with an increment in the average value of retail shopper's cart by about 67% to about 20$ (KES 2,016) recorded in 2011-2017. More so, the robust real estate industry has catapulted the expansion of the retail sector. Specific investments in the real estate industry, notably residential shopping malls and multi-purpose developments, have positively influenced the growth of the retail industry in Kenya. Statistics indicate that retail space increased by 41.6%, from 3.9 million square feet of space in 2016 to 5.6 million square feet in 2017. Nielsen suggests that the sector grew in formal retail by about 30% of Kenya's population, shopping at informal retail establishments (Nielsen, 2018). The Kenyan retail industry has the second-highest market in Sub-Sahara after South Africa, with a formal retail penetration of 60% (Cytonn, 2018).

Founded in 1975, Uchumi is the oldest retail chain, followed by Nakumatt, established in 1987. The two retail chains owned flagship stores in Nairobi, Mombasa, and Kisumu and served as crucial distributors for local consumer goods manufacturers. Afar from the two large retail chains, relatively smaller retail chains like Tuskys, Naivas, and Ukwala did the average customer (Cytonn, 2018). The mid-'90s saw a sporadic growth in retail chains to over 300 chains (Kiruga, 2013, cited by Chesula and Nkobe, 2018). Around this time, Uchumi spearheaded the concept of hypermarkets in Kenya. The retail chain landscape has changed over time, and both local and international players currently represent it well. Notable industry players are Tuskys (58 outlets), Nakumatt (45 outlets), Naivas (39 outlets), Uchumi (25 outlets), Choppies (10 outlets), Eastman (9 outlets), Chandarana Stores (8 outlets), Carrefour (4 outlets), Game Stores; Massmart (1 outlet). (Cytonn, 2018).

The sector operates under razor-thin margins of about 1.5%-3.8% making cost leadership strategy short-lived and unsustainable across the product portfolio (Business Daily, 2020). According to (Cytonn, 2018), Choppies, Shoprite, and Massmart have a net profit margin of 0.8%, 3.9%, and 1.4%, respectively. The low-profit margins are surmounted by leveraging economies of scale to buy and sell products (Cytonn, 2018).

For the longest time, players in the sector have been riding on ambition, abundant market opportunity, and investors' tolerance to expand—Uchumi Borrowed KES 3.6bn to double its footprint to 25 stores in Nairobi, Mombasa, and Kampala. Nakumatt also exhibited a sporadic growth from 10 retail outlets in 2002 to 42 in 2013 and 64 in 2016. Likewise, Tuskys grew to 60 outlets, whereas Naivas grew to 40 outlets.

Nonetheless, the sector has been in turmoil. The rapid expansion with insignificant return on investment, which is not adequate to meet the retail chains' working capital, has led to the insolvency of some retail chains. A case in point is Uchumi which was declared insolvent in 2006 and delisted from the Nairobi Securities exchange. Interventions to resuscitate the parastatal have had little impact (Cytonn, 2018). Following the downward spiral was Nakumatt, which exited the retail market due to her financial woes. According to (Business Daily, 2020), Nakumatt was put under receivership when it became insolvent with total liabilities of 35bn against total assets of 5.2 bn. More so, nearly the entire retail chains have been financially constrained. A report by the state department of trade (RoK, 2017) indicates that the retail chain's cash flow constraints are manifested by over 40 billion in debt, with two local retail chains accounting for two-thirds of the deficit mentioned above. Similarly, Shoprite acquired funding of US$5.49M to facilitate footing in the Kenyan market. The amount was part of a scooping credit facility of US$764M the retail chain had recorded in 2019 (RoK, 2017).

2. Literature Review

Chandra and Grabis (2016) delineated the dimensions of a Supply Chain Configuration (SCC). The researchers espoused that the scope of SCC encapsulates the dimensions of SCC, objectives, criteria, decision-making, and parameters. The study contended that measurement of SCC can be stratified into either horizontal extent or vertical extent. Accordingly, (Chandra and Grabis, 2016) opined that a supply chain is divided into tiers or echelons, and each level is composed of units with a generic functionality on one end. The study further decomposed the horizontal extent dimension into customer echelon, which is the most downstream tier, distribution echelon, manufacturing echelon, and supply tier, the most upstream tier. On the other end of the spectrum, (Chandra and Grabis, 2016) accentuated that vertical extent is comprised of numerous members that are spread across different echelons and that each echelon consists of at least one business unit possessing diverse contemporary functional areas such as design, marketing, and sales, production/manufacturing, inbound logistics, and outbound logistics.

Chandra and Grabis (2016, p.32-33) exemplified the need to improve SC delivery reliability, SC responsiveness, SC flexibility, SC costs optimization, and bolster SC asset management efficiency as the supply chain decision objectives. More so, (Chandra and Grabis, 2016) suggested that SCC precedes SCC decisions and that there are five types of decisions in SCC, namely; structural decisions, decisions characterizing links among SC units, decisions indicating quantity, time, and policies. According to (Chandra and Grabis, 2016, p.33-34), structural decisions include decisions on the location of SC facilities at different echelons, supplier selection, product allocation, and definition of facilities' capabilities. Decisions characterizing links among SC units include the choice of information exchange mechanisms, product/service delivery mode, restricting cooperation to specified relations, and establishing fixed connections among a pair of teams. Decisions characterizing quantity include purchases, products manufactured or processed, delivered,

shipment quantities across SC links, and capacity-related decisions. Decisions describing policies encompass choice of manufacturing strategies, adoption of information-sharing policies, selection of distribution channels, procurement policies, and adoption of outsourcing.

According to (Chandra and Grabis, 2016), the parameters for SCC are traditionally classified as either internal or external. External parameters for SCC are customer demand and requirements, while internal parameters reflect structural characteristics of SCC and include representation of existing SC structure, bill of materials, available capacity, and capacity requirements. Lambiase, Mastrocinque, Miranda, and Lambiase (2013) conducted a literature review to propose mathematical models for supply chain design and strategic planning. From the systematic review of previous literature, the study delineated seminal contributions concerning SC design and strategic planning. Diverse peer-reviewed literature corroborated the extant literature and theory that strategic decisions regarding SC design are upstream and downstream facility location decisions, capacity strategy, sourcing, and technology selection. The study established that studies about supply chain configuration models are well documented. The systematic literature review revealed that extensive literature had been built on different objective functions of SC to ground SCC models, i.e., about 78% of the reviewed peer-reviewed articles are on cost minimization models, and about 22% of the reviewed papers are pinned on the profit maximization objective of the the the organization. Additionally, about 98% of the models are diverse demand models independent of the goal. On the other hand, about 52% of the reviewed cases were fixed models, and on the contrary, about 46% of the articles reviewed had conceptualized variable models.

Pashaei and Olhager (2015) conducted a systematic literature review on the interactions between product architecture and supply chain design. The evaluation of the prior study was limited to reviewing how extant literature has conceptualized the nexus between modular, integral, and platform designs relating to specific aspects of supply chain design. The study established that previous literature has sufficiently addressed the interactions between product architecture and SC design. Existing literature on SC design has focused on coordination and integration of production-distribution models, while extant literature on architecture has focused on product family research design through platform-based product development, also conceptualized as modularity by different researchers. However, Pashaei and Olhager (2015) observed that none of the 19 reviewed journal articles have explicitly discussed the relationship between product architecture and supply chain design.

Further, the existing literature exemplified the spectrum of product architecture, from modular to integral. These papers were majorly conceptual. Another stream of the literature demonstrated the role of integrative organizational capability and coordination capability in general supply chains. Additionally, the study established that there existed past studies on product architecture in dyadic relationships. Pashaei, and Olhager (2015), clustered the past research into two major streams based on methodology; case studies on supplier integration, mathematical modeling of supplier selection, and location of module product sites.

Caniato, Golini, R and Kalchschmidt (2013) established the effect of global supply chain configurations on the relationship between supply chain improvement programs and operational performance improvement using a survey research design. The observation unit was the fifth edition of the International Manufacturing Strategy Survey. In this study, global sourcing, global manufacturing, and global distribution were the metrics that operationalized global SCC. Data collected from the respondents revealed that global SCCs have a moderating effect between SC improvement programs and performance improvement. In other studies, Hasani, Mokhtari, and Fattahi (2021) contended a robust multi-objective optimization model to configure green SC network structure under disruptions. Further, the study argued for a hybrid meta-heuristic algorithm to surmount the problems occasioned by computational intractability and multiple objectives. Essentially, the study underscored the need for a comprehensive compromise between supply chain competitiveness, resiliency, and environmental issues.

Tsinopoulos and Mena (2015) longitudinally and qualitatively explored configurations of SC integration. The study established that process structure precipitates the need for diverse SCCs that change as the products mature. In achieving this overriding objective, the study also demonstrated the dimensions that influence configurations of supply chain integration. Also, the study established how integration mechanisms differ from one design to another. Stasinopoulos and Mena (2015) contended that process structure and its relationship to customer demand, downstream the SC, and the extent of the product's newness to the manufacturer are the contextual dimensions affecting supply chain integration configuration decisions. The study further espoused four SC integration configurations: customized integration

configurations, ramp-up integration configurations, recurring integration configurations, and coordinated integration configurations. The study also underscored the dynamic nature of SC integration.

Song, Sun, and Wang (2018) used an empirical approach to contend a decision-making model that incorporated factors that significantly affect enablers of Supply Chain Network Design (SCND) in selecting the appropriate strategic SC configuration. The study teased out findings threefold. First, it established twelve drivers of SCND, contended a decision model, and proposed areas for further research in SCND. Iran University of Science and Technology, 2020, suggested a new forward and reverse SCND for medical supplies consumers, considering biological risks posed by the accumulation of medical wastes. The study contended a model with two objectives; profit maximization model derived from subtraction of costs such as logistics costs, inventory costs, sterilization costs, and costs of medical destruction from the revenues in the medical SC. The proposed model's second objective is to minimize medical risks, i.e., from infectious medical supplies. In general, the study established that redesigning the capacity for sterilization centers leads to decreased biological hazards and increased revenues.

Saied, Amphora, and Abdinnour (2019), empirically established how supply chain architecture and product architecture decisions influence organizational competitiveness. The study found that both product and SC architecture decisions impact performance. The study further demystified the performance implications of product modularity and supply chain agility capability. The study accentuated that product modularity encompasses all product configurations related to sourcing and product assembly, while SC agility configurations relate to velocity (capacity to sense, comprehend and respond) and visibility (supplier network, internal operations, and external environment).

Ivanov (2018) reviewed quantitative methods for the analysis of SCRES. First, the study posited the concept of resilience capacity and suggested that the resilience capacity of a supply chain comprises absorptive capacity. Ivanov (2018) espoused that it is the first line of defense and encompasses supplier segregation, multiple sourcing strategies, and inventory positioning elements. The second resilience capacity of SC is an adaptive capacity that is the second line of defense against disruptions and comprises components such as re-routing, backup suppliers, and end-to-end communication across SC. Also, according to Ivanov (2018), vital capacity is the third line of defense against disruption in SC and encompasses facility restoration, workforce restoration, and restoration of technology.

Further, Ivanov (2018) postulated a resilience hierarchy for SCRES that is compounded by four echelons. The bottom level has features that enhance/ enable SCRES, such as surplus inventory and backup suppliers. The enhancers of SCRES make up the SCRES capacity, the second level in the hierarchy. The third level is SC vulnerability and recoverability. And the fourth level is SCRES. Ivanov (2018) contended that SRES is an SC vulnerability and recovery function. Further to the above, Ivanov (2018), through a systematic review of extant literature, established that SC, agility, visibility, flexibility, collaboration/ and information sharing across the SC are key drivers contributing to SCRES taxonomy from a quantitative perspective.

3. Methodology

An ex-post facto research design was employed. The unit of analysis was retail chains in Nairobi City County, from which 324 respondents were selected using the non-zero probability of selection as contended by Schindler and Cooper (2014). The study adopted questionnaires as the primary data collection instrument. Construct validity was attained by ensuring that the questions in the data collection instrument were restricted to the conceptualization of the study variables and that each metric of the variables is within the same construct.

The questionnaire was used to collect data. The study adopted the internal consistency method to test the reliability of the data collection instrument. Internal consistency of the questionnaire was gauged using Cronbach's alpha (α) statistic against a cutoff point of 0.7 as recommended by (Cronbach, 1951). The researcher adopted the drop-and-pick method to collect the filled questionnaires from the respondents.

Quantitative data was analyzed by use of both descriptive statistics and inferential statistics. Measures of central tendencies and dispersion did a descriptive analysis of variables. Inferential data analysis was done through Exploratory Factor Analysis, Confirmatory Factor Analysis, and model fit assessment to establish relationships between observed

and latent constructs. Data was then exported into SPSS Analysis of Moment Structures (AMOS) for analysis. SPSS AMOS is convenient for performing structural equation modeling adopted in this study. Testing of the hypothesis was also done using Structural Equation Modeling.

4. Result and Discussion

4.1 Psychometric Properties

Reliability Test

Where there are different types of reliability, the study adopted the internal consistency method. And used the Cronbach Alpha coefficient to measure the internal consistency of the data collection instrument. Whereas there is no absolute rule for internal consistencies, most scholars conform to the supposition that a minimum internal consistency α coefficient of .70 is acceptable. In a similar vein,

S/No.	Objectives(s)	No. of Items	Cronbach Alpha
1.	Supply Chain Configuration	4	.726

Given a Cronbach α-value of 0.726, the study concludes that the data collection instrument was reliable.

4.2 Descriptive Statistics

Table 4.1: Descriptive on SC Configuration

Descriptive Statistics

S/No.	Statements	N	Mean	Std. Deviation
SCC1	The more the number of channel participants, the higher the order fulfillment rate	253	4.379	.53294
SCC2	Less dispersed physical location translates to increased supply chain costs	253	4.288	.70693
SCC3	Globalization increases the uncertainties, which cause supply chain disruptions.	253	4.156	.45678
SCC4	The higher the number of nodes, the less the lead-times	253	4.087	.78567
	N	253		

Cronbach Alpha = .726 with 4 items

To establish if SC configuration has a moderating effect on the relationship between dynamic supply chain capabilities and resilience in large retail chains in Kenya. The study operationalized SCC in three ways; no. of SC nodes, physical location dispersion, and SC network design. A five-point Likert scale statement question was structured for which the responses are presented in table 4.13 above. The majority of the respondents agreed that The more channel participants, the higher the order fulfillment rate ($\bar{x}$ = 4.3794, SD = .53294). The majority of the respondents also agreed that Less dispersed physical location translates to increased supply chain costs ($\bar{x}$ = 4.2885, SD = .70693). Further, the respondents

agreed that globalization increases the uncertainties, which cause supply chain disruptions ($\bar{x}$ = 4.156, SD = .45678) and that The higher the number of nodes, the less the lead times ($\bar{x}$ = 4.087, SD = .78567). These findings resonate with Sabri, Micheli, and Nuur (2017), who established six individual SC configuration settings and expounded on the motive behind different SC configuration decisions. These findings are consistent with Sabri, Micheli, and Nuur (2017), who conceptualized the relationship between six individual configuration settings and performance outcomes to obtain the optimal supply chain configuration and performance fit.

4.3 Inferential Statistics

Confirmatory Measurement Model

The first step in the analysis encompasses Confirmatory Factor Analysis (CFA) which estimates the measurement model of an array of measures such as internal reliability, convergent validity, and discriminant validity. Before conducting CFA, Exploratory Factor Analysis (EFA) was performed. The key steps included computation of factor loading matrix, communalities, and Principal Component Analysis (PCA).

Exploratory Factor Analysis

a) KMO and Bartlett's Test of Sphericity

Table 4.2: KMO and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.365**
Bartlett's Test of Sphericity	Approx. Chi-Square	766.751
	df	105
	Sig.	**.067**

Indicating that the variables are unrelated and hence suitable for structure detection. Before conducting EFA, Bartlett's Test of Sphericity was conducted. As a rule of thumb, this statistical test should yield a statistically significant $\chi 2$ value (p-value $\leq$.05) to justify the application of EFA (Watkins, 2018). A p-value < .05 shows that factor analysis is useful with one's data. Since the study sample was large, making Bartlett's Test of Sphericity sensitive to even trivial deviations from randomness, its results should be supplemented with a measure of sampling adequacy. Given this reality, the Kaiser-Meyer-Olkin (KMO; Kaiser, 1974) measure of sampling adequacy was conducted. Results of Bartlett's test of sphericity (Bartlett, 1954) indicated that the correlation matrix was not random, $\chi 2$ (253) = 766.751, p < .067, and the KMO statistic (Kaiser, 1974) was .365 below the minimum standard for conducting factor analysis. Therefore, the data set was inappropriate for factor analysis and hence not suitable for structure detection.

4.4 Hypothesis Testing

H_{01}: Supply chain configuration does not moderate the relationship between dynamic supply chain capabilities and resilience in the Retail Sector in Kenya. The overall model predicted that SCC had a negative moderating effect on the relationship between dynamic supply chain capabilities and resilience in the retail sector (β = -8.750, p = .0000).

H_{01a}: The study established that SCC has a negative moderating effect on the relationship between SC agility capability and resilience in the retail sector (β = -.035, p = .0000).

H_{02b}: The study established that SCC has a negative moderating effect on the relationship between SC analytic capability and resilience in the retail sector (β = -.110, p = .0000).

H_{01c}: The study established that SCC has a significant positive moderating effect on the relationship between SC innovation capability and resilience in the retail sector (β = .004, p = .0000).

H_{01d}: The study established that SCC has no moderating effect on the relationship between SC alignment capability and resilience in the retail sector (β = .000, p = .0000). These hypotheses disagree with Abdinnour (2019), who empirically

established how supply chain architecture and product architecture decisions influence organizational competitiveness and resilience.

4.5 Model Summary

Model Summary without Moderator

Table 4.3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.937[a]	.878	.876	.16564

a. Predictors: (Constant), x4, x2, x1, x3

R^2, taken as a set, the predictors; X1: Agility capability, X2: Analytics capability, X3: Innovation capability, and X4 Alignment capability account for 87.8% of the variance of the criterion variable; resilience in the retail sector.

Model Summary with Moderator

Table 4.4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.890[a]	.792	.789	.21638

a. Predictors: (Constant), x4z, x2z, x1z, x3z

R^2, taken as a set, the predictors; X1Z: Agility capability, X2Z: Analytics capability, X3Z: Innovation capability, and X4Z Alignment capability account for 79.2% of the variance of the criterion variable; resilience in the retail sector.

Table 4.5: Model Summary

Model	R	R square	Adjusted R Square	significance
Without Moderator	.937[a]	.878	.876	.000
With Moderator	.890[a]	.792	.789	.000

Table 4.6: ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.314	4	11.078	236.611	.000[b]
	Residual	11.612	248	.047		
	Total	55.925	252			

a. Dependent Variable: y
b. Predictors: (Constant), x4, x2, x1, x3

Table 4.7: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	49.103	4	12.278	438.500	.000[b]
	Residual	6.822	248	.028		
	Total	55.925	252			

a. Dependent Variable: y
b. Predictors: (Constant), x4z, x2z, x1z, x3z

The overall model without the moderator was significant (p= .000 less than .05). The general model with the moderator was also substantial (p= .000 less than .05). However, the model with the moderating variable had a decreasing effect from .878 to .792. Therefore the R^2 change was negative.

5. Conclusion

Academicians, practitioners, and quasi-governmental organizations have consistently endeavored to demystify the juxtaposition of why some players in the retail industry are exhibiting stellar performance while other players with the same operating environment remain in the doldrums. The study delved into unraveling this mystery. The rigorous and vigorous empirical analysis of the nexus between dynamic supply chain capabilities and resilience in the retail sector in Nairobi City. Interestingly, the study negates the diverse convectional practical stances that supply chain configuration positively moderates the relationship between dynamic SC practices and resilience in the retail sector.

From the analyzed data, the moderating effect of SCC has a reducing impact on the relationship between dynamic SC capabilities and resilience in the retail sector. In this regard, the study makes some substantive recommendations; that retail chains should reevaluate their suppliers upstream and engage in objective supplier base reduction and rationalization in reconfiguring. The study further recommends that retail chains foster strategic partnerships with strategic suppliers to eliminate upstream node barriers, leverage economies of scale, and eliminate superficial costs brought by extra SC nodes that absorb their profit margins.

Despite the study findings showing a positive correlation between physical dispersion and supply chain costs, from a network perspective, the more dispersed a network is, the more fragmented the network becomes. Reasonably, given external factors beyond the scope of this study, the retail chains should not engage in expansion spree but rather form physical clusters in high traffic and densely populated areas such as metropolitan counties and downtowns.

The study admits that it wasn't exhaustive or immune to systematic and procedural biases. In this regard, future researchers should undertake further studies to establish the influence of supply chain configurations on the resilience of retail chains. Succinctly, having found that SCC has a negative moderating effect on the relationship between dynamic SC capabilities and resilience, qualitative researchers should conduct further studies to corroborate the findings. Further, it is the most considered view of this research that qualitative researchers should investigate the phenomenon of why SCC has a negative moderating contribution using a grounded theory approach. A post-COVID evaluation of the retail chain's resumption to normalcy is timely.

References

- Abdul Hamid, M. and Azmi, S.M. (2011) The performance of banking during 2000-2009: Bank Islam Malaysia Berhad and conventional banking in Malaysia, International Journal of Economics and Management Sciences, Vol. 1, No. 1, pp. 09-19
- Chandra, C., & Grabis, J. (2016). Supply chain configuration: Concepts, solutions and applications (2nd ed., pp. 1-63). Springer. *CrossRef*
- Chesula, O., & Nkobe, D. (2018) Analyzing the course of tumoir in Kenya retail sector International Journal of Business and Management 6(8), 221–228
- Caniato, F., Golini, R., & Kalchschmidt, M. (2013). The effect of global supply chain configuration on the relationship between supply chain improvement programs and performance. International Journal of Production Economics, 143(2), 285–293. *CrossRef*
- Cronbach, L. J., & Gleser, G. C. (1959). Interpretation of reliability and validity coefficients: Remarks on a paper by Lord.
- Cytonn, (2018). Cytonn's Kenya's Real Estate Sector Retail Report 2018. Available: https://www.cytonn.com/topicals/cytonns-kenya-real-estate-sector-retail-report-2018#:~:text=Retail%20Sector%20Performance%20in%20Kenya,%25%20from%2080.2%25%20in%202017. (1 September, 2018).
- Ivanov, D. (2018). Revealing interfaces of supply chain resilience and sustainability: a simulation study. International Journal of Production Research, 56(10), 3507-3523. *CrossRef*
- Kaiser, H. F. (1974). An index of factorial simplicity. Psychometrika, 39(1), 31-36.

- Pashaei, S., & Olhager, J. (2015). Product architecture and supply chain design: a systematic review and research agenda. Supply Chain Management, 20(1), 98–112. *CrossRef*
- Republic of Kenya, (2017). Study of Kenya Retail Sector Prompt Payment. Available at https://www.tralac.org/documents/resources/by-country/kenya/581-study-on-kenya-retail-trade-sector-prompt-payment-june-2017/file.html
- Saeed, K. A., Malhotra, M. K., & Abdinnour, S. (2019). How supply chain architecture and product architecture impact firm performance: An empirical examination. Journal of purchasing and supply management, 25(1), 40-52. *CrossRef*
- Sun, S., Hisatomi, T., Wang, Q., Chen, S., Ma, G., Liu, J., ... & Domen, K. (2018). Efficient redox-mediator-free Z-scheme water splitting employing oxysulfide photocatalysts under visible light. ACS Catalysis, 8(3), 1690-1696.
- Tsinopoulos, C., & Mena, C. (2015). Supply chain integration configurations: process structure and product newness. International Journal of Operations & Production Management, 35(10), 1437–1459. *CrossRef*