International Journal of Innovation and Economic Development
ISSN 1849-7020 (Print)
ISSN 1849-7551 (Online)

URL: https://doi.org/10.18775/ijied.1849-7551-7020.2015.82.2002
DOI: 10.18775/ijied.1849-7551-7020.2015.82.2002

Volume 8
Issue 2
June, 2022
Pages 34-47

Nexus Between Agility Capability and Resilience in the Retail Sector

Desmond Mwangi Wairimu[1], Dennis Chege[2], Samuel Muli[1], Jackson Ndolo[2]
[1] School of Business and Entrepreneurship, Jomo Kenyatta University of Agriculture and Technology, Juja, Kenya
[2] School of Business, Kenya College of Accountancy University, Ruaraka, Kenya

Abstract: The retail sector is susceptible to unprecedented disruptions occasioned by unending sector specific turmoil and disruptions Succinctly, retail chains are not sufficiently resilient to adjust ex-ante and ex-post to disruptions The nature of retail chains; short product life cycle, razor thin profit margins and stiff competition has permeated and precipitated non-resilience to either resist, adjust or recover from both ex-post and ex-ante disruptions by the sector players pushing some firms to insolvency and liquidation However, in what is a juxtaposition of the retail chains, some sector specific players are ambidextrous to defy all turmoil and exhibit impeccable resilience This phenomenon augments the research problem that the researchers sought to explore the nexus between dynamic retail agility capability and resilience in the retail sector using Structural Equation Modelling. From the findings, the study rejected H01: There is no statistically significant relationship between SC agility capability and resilience in the Retail Sector. Conclusively, he results of this study postulate and advance the knowledge of dynamic SC Agility practices and resilience in the retail sector. It provides sufficient evidence of the facts contended herein and the nexuses thereto. Notably, the structural model was a good fit.

Keywords: Supply Chain, Agility, Resilience, Structural Equation Modelling, Dynamic Capability

1. INTRODUCTION

Brusset, and Teller, (2017), postulates that any supply chain should possess the capacity to surmount disruptions and unprecedented events. They also posit that any supply chain that possesses the capability to perform various activities relating to inbound logistics, upstream the supply chain, Original Equipment Manufacturer (OEM) and outbound logistics downstream the supply chain to deliver goods and services under turbulent circumstances is deemed to be a resilient supply chain. Additionally, Brusset, and Teller, (2017), underscores that it is critical for a supply chain to develop some capabilities to enhance resilience. Further, Brusset, and Teller, (2017), contended that such capabilities can take the form of lower order capabilities, operational capabilities and dynamic capabilities. According to Brusset, (2016), the dynamic capabilities approach enables practitioners in the supply chain to characterize supply chain capabilities that they so wish to enhance across their supply chain.

According to (Cytonn, 2018) retail segment in Kenya is experiencing exponential growth characterized by an increment in the average value of shopper's basket by 67% to about 20$ (KES 2,016) recorded in the period 2011-2017. More so, the robust real estate industry has catapulted the growth of retail chains. Specific investments in the real estate industry, succinctly, investments in real estates have positively influenced the growth of the retail industry in Kenya. Reviewed statistics indicate that retail space increased by 41.6%, from 3.9 million SQF of space in 2016 to 5.6 million SQFin 2017. Additionally, Nielsen, indicates that the sector growth in formal retail by about 30% of Kenya's population shopping informal retail establishments (Nielsen, 2018). The Kenyan retail sector ranks the second market in Sub-Sahara after South Africa, with a formal retail infiltration of 60% (Cytonn, 2018).

1.1 Problem Statement

On the flipside, the retail sector is susceptible to unprecedented disruptions occasioned by unending sector-specific turmoil and disruptions (Chesula, 2018). The susceptibility is brought about by the operating nature of the retail chains in the sector; perishability of the goods, low profit margins and high market contestability. For these reasons, and others, retail chains are not sufficiently resilient to adjust ex-and ex-post to disruptions, consistent with the postulations of (Vizinger, and Zerovnik, 2018), that the nature of retail chains makes them sensitive, susceptible and vulnerable to retail chain specific disruptions and the domino effect is that they fail on the resilience litmus test to increase their reliability, flexibility and convenience. This has permeated and precipitated non-resilience to either resist, adjust or recover from both ex-post and ex-ante disruptions by the sector players pushing some firms to insolvency and liquidation.

Interestingly, other retail chains have exhibited dynamic capability to be robust to resist, respond and recover from such disruptions to survive the marketplace. For instance, Kanyan based Quickmatt is one of the fastest growing retail chains in Africa with an absolute growth rate of 311% and a Compound Annual Growth Rate (CAGR) of 60.2% (FT, 2022). Whilst, other players such as Tuskkys, Nakumatt, Choppies are on downward spiral. 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 on economies of scale on buying and selling of 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 both Kenya and Uganda. Nakumatt also increased its outlets in 2002 form a total of 10 to 42 in 2013 and about 64 in 2016. Likewise, Tuskys grew to 60 outlets whereas Naivas grew to 40 outlets.

Nonetheless, the sector has been under 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 delisting from Nairobi Securities exchange. Interventions to resuscitate the parastatal have had little impact up to date (Cytonn, 2018). Following the downward spiral was Nakumatt, which exited the retail market due to her financial woes. According to (RoK, 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. In this vein, 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 debt with two local retail chains accounting for two-thirds of the debt as mentioned above. Similarly, Shoprite acquired funding of US$5.49M to facilitate footing in the Kenyan market. The amount being part of a scooping credit facility of US$764M the retail chain had recorded in 2019 (RoK, 2020).

In sum, players in the retail sector have exhibited notoriety of delaying supplier payments, issuing bouncing cheques, threats to delist and actual delisting of suppliers with no plausible reasons thereof, the unjust return of goods to suppliers, in part or whole. Following this notoriety, the government of Kenya, through the State department of trade, was constrained to conduct investigations on Kenya's retail sector prompt payment (RoK, 2017). Nearly all retail chains are indicative of the turmoil mentioned above. It is against this brief outline that the study aims at developing and testing hypotheses on the nexus between dynamic agility capability and resilience in the retail sector in Kenya.

1.2 Aim of the Study

To fulfill this objective, we aimed at testing the hypothesis H01: There is no statistically significant nexus between agility capability and resilience in the retail sector.

2. Literature Review

2.1 Theoretical Framework

Our study is grounded on Structural Dynamics Theory. Proponents of this theory are (Reyer and Chopra, 2011; Humear, 2012). Tenents of structural the aforementioned theory considers discrete and continuous systems subject to mechanical systems responses to dynamic loads (Paz, 1990). In respect to engineering discipline, structural dynamics control deals with synchronization of multiplex networks that often than not, are affected by both internal and external networks.

Just like structural dynamics in engineering, retail supply chain networks are equal to dynamic systems are subject to both structural and parametrical changes and such dynamics are encountered daily in a supply chain (Hasani and Khosrajerdi, 2016; Iranov, 2018). More succinctly, (Iranov, et al., 2017) delineates that supply chains equally represents multiplex and synchronized networks that run under uncertain environments and are therefore predisposed to turbulence (Simchi-Levi et al., 2015; Martal and Klbi, 2016;. as cited in Iranov, 2018).

According to Iranov, (2018) by use of control theory, some elements of SC resilience outcomes such as 'stability, robustness, adaptability,' can be taken into account. Iranov, (2018) further accentuates that structural dynamics theory contributes to extant literature in SCM precisely in the adaptive understanding of planning and control processes. In this light, Structural dynamics control theory can be used to underpin the adaptive capability of retail resilience in the pre- during and post disruption recovery stages of disruption. Additionally, Iranov, (2018) opine that the theory underpins process level SC dynamics as well as changes agility capability and as such, they significantly contribute to Structural dynamics control theory.

The criterion variable under study is premised on structural dynamics theory. Retail chains are analogous to structural dynamics. They equally operate under complex, multi-tiered supply chain networks and operate in highly uncertain environments such as demand uncertainty and consequently exposed to a castellation of risks and disruptions such as the "Forrester effect." As a result, resilient retailers proactively create back up resources, inventory and to adjust ex-ante to disruptions. Agility capabilities are leveraged on as well in reactive control stage, in retail chains in order to recover ex-post to disruptions.

2.2 Empirical Review of Agility Capability

Gligor, Holcomb, and Stank, (2013) conducted a literature review to conceptualize Supply Chain Agility (SCA). The study established that SCA is comprises of five different elements that are alertness, accessibility, decisiveness, swiftness and flexibility. Further, Gligor, Holcomb, and Stank, (2013) developed and tested the scales for each of the five dimensions of agility. The study collected data from senior level managers who were knowledgeable about SCM processes and activities using non-experimental research design. The results of the analysis model indicated adequate fit. Resultantly, Gligor, Holcomb, and Stank, (2013) defined SCA as the organization's ability to exhibit both cognitive and physical capabilities that equips the organization to speedily sense changes, opportunities, and threats (alertness), access important information (accessibility), resolute decision making (decisiveness) and promptly implement decisions (swiftness), and adjust its variety of SC tactics and operations to the desired level required to roll out the organization's strategy (flexibility). Al, Shi, and Behnia, (2020) conducted a systematic literature review of definitions enablers and performance implications of Supply Chain Agility (SCA) using fifty six peer reviewed articles. The study extracted twenty five definitions on SCA. The definitions collectively encapsulated four perspectives of the concept of SCA namely speed, scope of agility, mode of agility and outcomes of agility. 70% of the reviewed articles (18) incorporated speed in their contextual definition of SCA. The most used construct for speed was lead time. With respect to scope of responsiveness, the study established that out of the 56 reviewed papers, there were 12 definitions of SCA that had encapsulated responsiveness to change as another element of agility. According to the reviewed literature, responsiveness is twofold; demand responsiveness i.e. variety, volume and value and supply responsiveness. More so, extant literature elucidates that agility can adopt either proactive mode or reactive mode or even mixed responsiveness. According to Al, Shi, and Behnia, (2020),

reactive mode of responsiveness dominated most definitions and it encompasses an array of defensive mechanisms that are unleashed in rejoinder to an existing threat Gligor et al., (2013) as cited in Al, Shi, and Behnia, (2020).On the other hand, the study determined that proactive responsiveness is pursued by firms in response to disruptive events that precipitate opportunities. Resultantly, such firms exhibit opportunity seeking tendencies. Though seldom used in definition of SCA, the study established that the outcome of SCA is to achieve a greater return on investment and sustain competitiveness.

More so, Al, Shi, and Behnia, (2020) analyzed influencing elements of achievement of SCA. The study stratified all the 11 SCA enablers into exclusive proactive enablers, exclusive reactive enablers and common enablers (both reactive and proactive enablers). The proactive enablers are domiciled in the upstream Supply Chain (SC) and they are at least concerned with sensing market changes, as well as harmonizing operational capabilities. The reactive enablers strive to at least moderate and counteract consequences of unanticipated occurrences. Also, the study established that combined enablers provide a synergetic response to disturbance and they include supportive information technology, collaborative relationship, logistics and distribution capabilities (Braunscheidel and Suresh, 2009) as cited by Al, Shi, and Behnia, 2020).

Aslam, Blome, Roscoe, S and Azhar, (2018) sought to establish how market sensing, SCA, and adaptability affects Supply Chain Ambidexterity (SCX). The study adopted a survey research design. The unit of analysis was Pakistani manufacturing firms. The study developed and tested hypotheses on market sensing, SC ambidexterity and mediating role of SCA. From the above findings, the study concluded that market sensing capability is an antecedent of SCA, and SC adaptability. Also, it concluded that SCA directly affects SC adaptability which latently affects SCX. As such, the study generally concluded that SCA plays a mediating role between SC adaptability and SCX.

Yusuf, Menhat, Abubakar, and Ogbuke, (2020) empirically investigated whether agile capabilities are a necessary condition for maximizing sustainable supply chain performance. The study adopted a survey research design, the study was based in UK and the unit of observation was 311 respondent organizations. The study established that there existed a high correlation between Sustainable Supply Chain (SSC) Practices and agile practices. The study also established that SC agile practices predict sustainability performance. Further, the study established that increased SC practices posit a strong positive correlation and statistically significant impact on sustainability performance. More so, the study established that there was a positive correlation between SC agile practices. Additionally, the results of the study have it that when SSC practices are mediated through agile initiatives, higher level of operational performance is yielded and there are better sustainability outcomes. More so, the results of the study indicated a strong case for mediation. In this regard, the study contended that agile capabilities evolve as a result of a firm's response to consumer demand for sustainable product.

Gligor, Esmark, and Holcomb, (2015) conducted a study to establish performance outcomes of SCA and to determine when an organization should be agile. For purposes of achieving the goals of this study, a non-experimental survey research design. The population under study was the firm and study sampled top ranking executives who were well versed with SC processes and activities and were also involved in operational and strategic decision making. The study accepted the hypothesis that there was a direct and positive relationship between firm supply chain agility and cost efficiency. Further, the results of the study supported the hypothesis that there is a direct and a positive relationship between firm supply chain agility and customer effectiveness. Nonetheless, the results of the study failed to accept the hypothesis that firm supply chain agility has a direct and positive relationship with firm performance. In sum, the findings of this study provide an empirical basis for the firms to embrace agile strategies when operating in unpredictable environments.

Ahmed, Najmi, Mustafa, and Khan, (2019) developed a model to establish factors affecting organizations agility capability and competitive capability. The metrics for the assessment of the model were speed, visibility, flexibility, and responsiveness. Using these metrics, the study

hypothesized that speed of SC, visibility of SC, flexibility of SC, responsiveness of SC, and learning orientation has a significant impact on agility. The study also hypothesized that SCA has a significant impact on competitive capability. Data was analyzed using Partial Least Square method and Structural Equation Modeling (SEM). The study established that flexibility, learning orientation, responsiveness, speed, and visibility are statistically significant and they are positively correlated with SCA. Also, the study established that SCA capability has a positive and a statistically significant relationship with competitive capabilities. From the above findings, Ahmed, Najmi, Mustafa, and Khan, (2019) espoused that managers should build resource flexibility in their organizations, engage in New Product Introductions (NPIs), manage a large product base, exhibit the capability to swiftly change customer orders and product lines and conduct long term collaboration with their partners.

In their seminal yet conceptual work, (Tarafdar, and Qrunfleh, 2016) espoused that agile supply chain strategy has three overriding objectives. The first objective is flexibility; where a firm offers customized product and configurations. The second objective is responsiveness where there is quick reactions to change in customer demand. The third objective is adaptability, the capacity of an organization to cope with sudden changes in product lifecycles.

Saeed, Malhotra, and Abdinnour, (2019), conducted a systematic literature review to establish how extant literature has conceptualized SC agility capabilities. Tse et al., 2016; Chiag et al., 2012; cited by (Saeed, Malhotra, and Abdinnour, 2019), dimensionalized supply chain agility into demand responsiveness, customer responsiveness and joint planning. Braunscheidel and Suresh, 2019 cited by (Saeed, Malhotra, and Abdinnour, 2019) added visibility to the aforementioned dimensions. Gligor, 2015, cited by (Saeed, Malhotra, and Abdinnour, 2019) operationalized SC agility into alertness, accessibility, swiftness, and flexibility. Swafford, (2006), demystified the dimensions of supply chain agility and accentuated that they include reduced lead times, product development times, adjustments in delivery, responsiveness and setup time.

3. Research Methodology

This study adopted a positivist epistemology stance. Epistemology is concerned with what comprises of acceptable knowledge in any given field of study (Saunders, Lewis, and Thornhill, 2019,). According to Sekeran and Bougie, (2010), positivism helps test speculations and evaluates possible relationship between several variables.

3.1 Research Design

The study adopted an ex-post facto, cross-sectional, survey research design with a deductive approach. This method was selected because the researcher had no control group, there will be no randomization of study sample. Again, the researcher has no baseline that is often used in absence of control group in case of quasi-experiments (Schindler and Cooper, 2014). The study was cross-sectional because the study was conducted only once and revealed a snapshot of one point in time (Schindler and Cooper, 2014; Saunders, 2019). It is a deductive study since it espoused the casual relationships between study variables, and it permitted testing of contended relational hypotheses (Saunders, Lewis, and Thornhill, 2019, p. 125).

3.2 Population

The population for purpose of this study was the retail sector in Kenya. The sector was been selected for the study owing to non-resilience among players in the sector. They are recording a significant upward trajectory on engagement on SC dynamic capabilities to at-least adjust ex-post to the disruptions to garn resilience.

The target population for this study was large retail chains in Nairobi City County licensed by Nairobi City County Government. This is informed by the fact that given the cosmopolitan nature of the Nairobi City County, retail chains in this county are experiencing relatively higher disruptions, leading to the closure of some of the retail chains whilst adjusting ex-post to the disruptions by leveraging dynamic capabilities to be resilient to at-least maintain their market-share (RETRAK, 2020).

According to Nairobi City Government, the number of employees employed directly by the large retail chains in Nairobi City County is 3, 200. For purpose of sampling in this study, a sampling frame was obtained from Nairobi City County Government.

3.3 Sample Size and Sampling Technique

Sampling in this study is informed by the premise that the retail sector, the population under study, is large, and second, the population elements under study are not significantly different from each other. Consequently, census was not feasible. Stratified random sampling was used to determine the study respondents. Schindler and Cooper, (2014), postulate that any selected sample shall have a non-zero probability of selection; 0.101. Therefore, the sample size of the study was computed as follows;

$$0.101 = \text{Sample size}/3200$$

$$= 324 \text{ respondents}$$

The sample above was proportionately distributed across all the 102 listed large retail chains in Nairobi City County.

3.4 Data Collection Instrument

For purposes of accomplishing the objectives of this study, primary data was collected by means of questionnaire. The questionnaire was semi-structured and contained both open and closed questions. Additionally, it contained category question, ranking questions, rating questions, quantity questions and matrix questions. We obtained a research permit, and self-administers the questionnaires to the study participants specifically, we adopted the drop and pick method to collect the filled questionnaires from the respondents.

4. Data Analysis and Interpretation

4.1 Response Rate

A total of 324 questionnaires were populated and distributed to respondents and 253 out of the 324 were filled and returned. This represents a response rate of 78.09%.

4.2 Psychometric Properties

4.2.1 Reliability Test

We adopted the internal consistency method and used Cronbach α coefficient to measure the internal consistency of the data collection instrument. Whereas there no absolute rule for internal consistencies, most scholars conform to supposition that a minimum internal consistency α coefficient of .70 is acceptable.

Table 1: Reliability

Construct(s)	Cronbach α-Value	No. of Items
Agility Capability	.749	15

4.3 Descriptive Statistics

4.3.1 Agility Capability

To establish the relationship between agility capability and resilience in large retail chains in Kenya. The study operationalized SC agility capability in three ways alertness, flexibility and swiftness. To obtain this information from the respondents, a five point Likert scale statement questions were structured for which the responses are presented in the table above.

Table 2: Descriptive Statistics on agility capability

S/No	Statements	N	Mean	Std. Deviation
SCAC1	We promptly detect changes in the business environment	253	4.59	.63
SCAC2	We promptly identify and seize business opportunities in the business environment	253	4.34	.78
SCAC3	We promptly sense threats in the business environment	253	4.32	.67
SCAC4	We promptly detect stock re-order levels	253	4.60	.67
SCAC5	We promptly sense shopper's reaction to new merchandise	253	4.05	1.03
SCAC6	We are flexible enough to ensure there is on shelf product availability	253	4.64	.69
SCAC7	We are flexible enough to handle shopper's reaction to new merchandise	253	4.21	.85
SCAC8	We are flexible enough to undertake last minute promotions to meet quarterly sales goals	253	4.05	1.18
SCAC9	We flexible enough to react timely to changes in customers' orders, tastes and preferences	253	4.33	.76
SCAC10	We quickly implement decisions regarding to increase short term capacity as needed	253	4.21	.72
SCAC11	We quickly provide a variety of inbound logistics options e.g. transportation, warehousing and stock inventory	253	4.25	.82
SCAC12	We quickly adjust our merchandise to meet customer's needs	253	4.58	.54
SCAC13	We quickly undertake order processing	253	4.50	.62
SCAC14	We quickly undertake retailing of an assortment of supplies	253	4.43	.78
SCAC15	We differentiation our SKUs	253	4.05	1.04
	N	**253**		

Cronbach Alpha value = .749 with 15 items

As indicated in the table above, on alertness, a ($\bar{x}$ = 4.5968, SD = .63894), respondents strongly agreed that they promptly detect changes in the business environment. Also, respondents agreed that they promptly identify and seize business opportunities in the business environment as indicated by a ($\bar{x}$ = 4.3439, SD = .78448). Respondents agreed

that they promptly sense threats in the business environment as indicated by a ($\bar{x}$ = 4.3241, SD = .67089). Study participants strongly agreed that they promptly detect stock re-order levels as indicated by a ($\bar{x}$ = 4.6047, SD = .67399). Respondents agreed that they promptly sense shopper's reaction to new merchandise ($\bar{x}$ = 4.0514, SD = 1.03956). Additionally, on flexibility, respondents strongly agreed that they are flexible enough to ensure there is on shelf product availability as indicated by a ($\bar{x}$ = 4.6443, SD = . 69575). Respondents agreed that they are flexible enough to handle shopper's reaction to new merchandise as indicated by a ($\bar{x}$ = 4.2174, SD = .85691). More so, respondents agreed that they are flexible enough to undertake last minute promotions to meet quarterly sales goals ($\bar{x}$ = 4.0553, SD = 1.18057). Respondents agreed that they are flexible enough to react timely to changes in customers' orders, tastes and preferences ($\bar{x}$ = 4.3360, SD = 76231). Further, on swiftness, respondents agreed that they quickly implement decisions regarding to increase short term capacity as needed ($\bar{x}$ = 4.2134, SD = .72505). Study participants agreed that they quickly provide a variety of inbound logistics options e.g. transportation, warehousing and stock inventory ($\bar{x}$ = 4.2569, SD = .82207). Additionally, respondents strongly agreed that they quickly adjust their merchandise to meet customer's needs ($\bar{x}$ = 4.5810, SD = .54039). Study participants further agreed that they quickly undertake order processing ($\bar{x}$ = 4.5020, SD = .78184). Respondents also agreed that they quickly undertake retailing of an assortment of supplies ($\bar{x}$ = 4.4308, SD = 1.04675). Respondents also agreed that they differentiate their SKUs ($\bar{x}$ = 4.0593, SD = 1.04675).

Qualitative data was analyzed using content analysis and the following themes emerged; that agility is the ability to quickly change direction, ability to speed/accelerate operations, ability to scan the retail environment and anticipate the changes in the operating environment and it also entails the ability to empower the customer. The respondents also intimated that ability to integrate processes qualifies as agility capability. Respondents indicated that considering information lead-time is an objective metric to measure agility of the retail chain in order processing. And that agility can either be reactive or proactive. To a large extent, the pattern of these findings are consistent with extant literature pertaining to agility. Concisely, this study is in agreement with Gligor, Holcomb, and Stank, (2013) who conducted a multidisciplinary literature review to conceptualize supply chain agility and established that SC agility is comprises of five distinct dimensions that are alertness, accessibility, decisiveness, swiftness and flexibility. Further, these findings are consistent with Kumar, and Suresh, (2021) established that retail chains are agile, they possess the dynamic capability to anticipate changes in the marketplace and proactively restructure its interior environment.

4.4 Inferential Statistics

4.4.1 Common Method Variance

The study adopted the CFA marker technique that produced a t-statistic of 0.01, as indicated in the figure below. Conclusively, CMV was not a concern in this study as the test statistic was less than the recommended test statistic of up to 0.21.

4.4.2 Confirmatory Measurement Model

The first step in the analysis encompasses Confirmatory Factor Analysis (CFA) which evaluates the measurement model of an array of criteria such as internal reliability, convergent validity and discriminant validity. Prior to conducting CFA, Exploratory Factor Analysis (EFA) was conducted.

Table 3: Descriptive on Construct Validity for Supply Chain Agility Capability
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.723
Bartlett's Test of Sphericity	Approx. Chi-Square	766.751
	df	105
	Sig.	.000

Bartlett's Test of Sphericity was applied to test of the factorability of the correlation matrix. As a rule of thumb, this test should yield a statistically significant Chi square value (p-value $\leq$ .05) to warrant the use of EFA indicating that the variables are unrelated hence suitable for structure detection (Watkins, 2018). A p-value < .05 indicates that factor analysis is useful with ones data. Since large samples makes Bartlett's Test of Sphericity sensitive to even trivial deviations from randomness, the test was supplemented with the Kaiser-Meyer-Olkin (KMO; Kaiser, 1974) measure of sampling adequacy. Results of Bartlett's test of sphericity (Bartlett, 1954) indicated that the correlation matrix was not random, $\chi 2$ (253) = 766.751, p < .001, and the KMO statistic (Kaiser, 1974) was .723, well above the minimum standard for conducting factor analysis. According to Williams, Brown and Onsman, 2013) the sampling adequacy threshold should be more than 0.5. Therefore, it was determined that the correlation matrix was appropriate for factor analysis and hence suitable for structure detection.

4.4.3 Communalities

Table 4: Communalities for Supply Chain Agility Capability

SCAC	Statements	Initial	Extraction
SCAC1	We promptly detect changes in the business environment	1.000	.462
SCAC2	We promptly identify and seize business opportunities in the business environment	1.000	.781
SCAC3	We promptly sense threats in the business environment	1.000	.608
SCAC4	We promptly detect stock re-order levels	1.000	.696
SCAC5	We promptly sense shopper's reaction to new merchandise	1.000	.662
SCAC6	We are flexible enough to ensure there is on shelf product availability	1.000	.578
SCAC7	We flexible enough to react timely to changes in customers' orders, tastes and preferences	1.000	.642
SCAC8	We are flexible enough to undertake last minute promotions to meet quarterly sales goals	1.000	.496
SCAC9	We flexible enough to react timely to changes in customers' orders, tastes and preferences	1.000	.398
SCAC10	We quickly implement decisions regarding to increase short term capacity as needed	1.000	.474
SCAC11	We quickly provide a variety of inbound logistics options e.g. transportation, warehousing and stock inventory	1.000	.347
SCAC12	We quickly adjust our merchandise to meet customer's needs	1.000	.539
SCAC13	We quickly undertake order processing	1.000	.501
SCAC14	We quickly undertake retailing of an assortment of supplies	1.000	.625
SCAC15	We differentiation our SKUs	1.000	.548
	Extraction Method: Principal Component Analysis.		

Principal Component Analysis, (PCA) was used for factor extraction. Only variables with factor loadings above .32 are intrerprated (Pallat, 2010. The communalities in the column labeled **Extraction** reflect the common variance in the data structure. Small values indicate variables that do not fit with the factor solution and should be candidate for dropping from the analysis. The table 4.18 above shows the variables before and after extraction. For purposes of this study, the threshold was set at above 0.6. The study retained SCAC2, SCAC4, SCAC5, SCAC7 and SCAC14. The extraction communalities were greater than 0.5, as shown in and are acceptable, indicating that the variables fitted well with other variables in their factor (Pallant, 2010).

4.4.4 Total Variance Explained for SC Agility

Table 5: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.020	20.135	20.135	3.020	20.135	20.135	2.256
2	1.694	11.294	31.429	1.694	11.294	31.429	1.663
3	1.381	9.207	40.636	1.381	9.207	40.636	1.901
4	1.195	7.970	48.606	1.195	7.970	48.606	1.700
5	1.067	7.115	55.720	1.067	7.115	55.720	1.566
6	.998	6.655	62.375				
7	.887	5.911	68.286				
8	.819	5.460	73.745				
9	.811	5.405	79.150				
10	.670	4.466	83.617				
11	.612	4.077	87.694				
12	.559	3.730	91.424				
13	.525	3.503	94.927				
14	.477	3.180	98.107				
15	.284	1.893	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

The principal components analysis was conducted and five factors that had eigen values greater than 1.0 were extracted. These factors (1, 2, 3, 4, & 5) accounted for 20.135%, 11.294%, 9.207%, 7.970%, and 7.115% of the variance respectively and cumulatively accounted for 55.720 of the variance as shown in table 5 above.

4.4.5 Component Matrix

PCA was applied to validate construct validity. A total number of 30 items were loaded. These items were aggregated into two factors, Agility Capability, Supply and Resilience in the retail sector. Factor loadings for all the items were above 0.7, which satisfied the minimum criteria of 0.30 (Hair et al., 2010). The table 6 below indicates the results of factor analysis. The pattern matrix coefficients for this study ranged between 0.741-0.998 indicating that the variables are almost perfectly related to a factor pattern.

4.4.6 Confirmatory Factor Analysis

Additionally, CFA was conducted to assess the construct validity in the measurement model on an array of criteria such as convergent validity, discriminant validity and internal reliability.

Table 6: Principal Component Analysis

	Indicators/variables	SC Agility Capability
SCAC2	We promptly identify and seize business opportunities in the business environment	.860
SCAC4	We promptly detect stock re-order levels	.809
SCAC5	We promptly sense shopper's reaction to new merchandise	.858
SCAC7	We flexible enough to react timely to changes in customers' orders, tastes and preferences	.819
SCA14	We quickly undertake retailing of an assortment of supplies	.858

Table 7: Total Variance Explained Convergent Validity

Constructs	Composite reliability	Average variance Extracted (AVE)
Agility Capability	0.816	0.528

In case for convergent validity, the factor loadings should be at least 0.5 (Pansuwong, 2009; Hair *et al.,* 2010). In this study, the average loadings are more than 0.7 indicating they are high enough to be convergent, as shown in the table above. Composite Reliability (CR) suggests a cut off value of 0.6 or higher for acceptability which indicates internal consistency of measurement model (Hair et al., 2010). As shown in the table the CR value of all items ranged between 0.801 to 0.935 evident of existence of a high internal reliability of the data. Conclusively, internal validity of the data was met.

Discriminant validity establishes that the measures should not be related and are, in reality, not related (Hair, et al., 2010). The table indicates that none of the loadings is greater than 0.7 effectively demonstrating discriminant validity.

Table 8: Descriptive on Discriminant Validity

Construct	SC Agility	Resilience
SC Agility	1.000	0.148
Resilience	0.148	1.000

Analysis of Moment Structures software (SPSS-AMOS) was used to undertake CFA, measurement model, and structural equation modeling. For purposes of this study, each model variable was tested for normality and outliers on variable aspects. This was Exploratory Data Analysis (EDA) for understanding the structure of variable before further data analyses were undertaken. This enabled the researcher to undertake the application of appropriate analytical data analyses techniques to avoid crucial violations of key assumptions in consequent modeling processes.

This was followed by testing of the model fit. In SEM, the fit indices establish whether, overall, the model is acceptable and if acceptable, the researcher then establishes if the specific paths are significant (Moss, 2009). The study adopted two types of fit indices that are commonly used; absolute fit indices and incremental fit indices (Hair et al., 2010). For the case of absolute fit indices, this study applied the Goodness-of-Fit Index, (GFI), Adjusted Goodness-of-Fit (AGFI) and Root-Mean-Square Error of Approximation (RMSEA). On the other hand for Incremental Fit Indices, Comparative Fit Index (CFI), and Normed Fit Index (NFI) were used.

4.4.7 Normality Test of Study Variables

The study adopted Kolmogorov-Smirnov and Shapiro-Wilk goodness of fit test to assess normality. Thode, (2002) averred that Kolmogorov-Smirnov is used for large samples while Shapiro-Wilk test is used for small samples. The p-values of the test results were > .05 as shown in the table 4.27 below.

Table 9: Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
SC Resilience	.112	252	.068	.965	252	.059
Agility	.101	252	.075	.962	252	.050

a. Lilliefors Significance Correction

This implies that the data used for analysis was normal.

Table 10: Confirmatory factor analysis model fits of SC agility Capability

Model	**CMIN**	**GFI**	**AGFI**	**NFI Delta1**	**TLI rho2**	**CFI**	**RMSEA**
Default model	62.330	.917	.690	.795	.904	.902	.041
Saturated model	.000	1.000		1.000		1.000	
Independence model	303.982	.681	.521	.000	.000	.000	.342

For SC agility capability, the assessment of model fit shows a normed chi-square (chi-square/degree of freedom) values of (X2 = 62.330, P < 0.05); CFI value of 0.902; TLI value of 0.904; CFI value of 0.902 and RMSEA value of 0.041. This indicates that the model provides a good model fit. As well, the components give a good structure in which to continue the structural equation modeling.

4.4.8 Hypothesis Testing

Table 11: Hypothesis Testing Results

			β	**S.E.**	**C.R.**	**P**
agility	<---	resilience	1.766	.444	3.975	***

H_{01}: There is no statistically significant relationship between SC agility capability and resilience in the Retail Sector in Kenya.

The study established that there was a statistically significant positive relationship between supply chain agility capability and resilience in the retail sector resilience (β = 1.766, p = 0.000). Hence, the study rejected the null hypothesis. These results corroborates with the findings of Gilgor, Esmark and Holcomb, (2015) which contended the hypothesis that there is a direct positive relationship between firm SC agility and performance outcomes. More so, the results of the study further converges to the findings of Ahmed, Najmi, Mustafa, and Khan, (2019), which used Partial Least Square Method and Structural Equation Modeling and found

out that flexibility, responsiveness, learning orientation, swiftness and visibility were statistically significant and they are positively correlated with SC agility. Additionally, the study findings are in agreement with Baah, Agyeman, Agyabeng-Mensah, Afum, Issau, and Faibil, (2021) which established that there was a statistically significant positive relationship between supply chain agility and supply chain performance. (β= 0.158***, T= 2.641). The statistically significant positive relationships, between agility and resilience, performance outcome is attributed to the ability of the agile firms to respond swiftly to customer needs and market volatilities.

5. Conclusion and Recommendations

The results of this study postulate and advance the knowledge of dynamic SC Agility practices and resilience in the retail sector. It provides sufficient evidence of the facts contended herein and the nexuses thereto. Notably, the structural model was a good fit even prior to post ad-hoc modifications. Succinctly, the study adopts the dynamic capability view to demonstrate that supply chain agility practices are direct sources of resilience in the retail sector. We expressly reaffirms the axiomatic recognition of supply chain dynamic capabilities in the reals of retail logistics. Precisely, the study provides a novel yet dimensional contribution to the extant literature on the subject matter aforementioned using a theory driven approach through Structural Equation Modelling to provide an empirically evaluated practical insights into retail resilience using dynamic capabilities.

Given the findings of the research on the relationship between agility capability and resilience in the retail sector; the study recommends that retail chains should focus more on flexibility and swiftness. This will enable them to exhibit ambidexterity ex-ante and ex-post disruptions. This will equip the retail chains with the capability to identify and seize business opportunities, give a timely response to market place dynamics.

References

- Adofu, I., and M. Abula."Domestic debt and the Nigerian economy." Current Research Journal of Economic Theory 2.1 (2010): 22-26.
- Ahmed, W., Najmi, A., Mustafa, Y., & Khan, A. (2019). Developing model to analyze factors affecting firms' agility and competitive capability. Journal of Modelling in Management, 14(2), 476-491. *CrossRef*
- Al, H. E., Shi, Y., & Behnia, M. (April 28, 2020). Supply chain agility: a systematic review of definitions, enablers and performance implications. International Journal of Physical Distribution & Logistics Management, 50(2), 287-312. *CrossRef*
- Aslam, H., Blome, C., Roscoe, S., & Azhar, T. (2018). Dynamic supply chain capabilities: How market sensing, supply chain agility and adaptability affect supply chain ambidexterity. International Journal of Operations & Production Management, 38(12), 2266–2285. *CrossRef*
- Baah, C., Agyeman, D. O., Acquah, I. S. K., Agyabeng-Mensah, Y., Afum, E., Issau, K., ... & Faibil, D. (2021). Effect of information sharing in supply chains: understanding the roles of supply chain visibility, agility, collaboration on supply chain performance. Benchmarking: An International Journal.
- Brusset, X., & Teller, C. (2017). Supply chain capabilities, risks, and resilience. International Journal of Production Economics, 184, 59–68. *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
- 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).

- Gligor, D., Holcomb, M., & Stank, T. (2013). A Multidisciplinary Approach to Supply Chain Agility: Conceptualization and Scale Development. Journal of Business Logistics, 34(2), 94–108. *CrossRef*
- Gligor, D., Esmark, C., & Holcomb, M. (2015). Performance outcomes of supply chain agility: When should you be agile? Journal of Operations Management, 33-34(1), 71–82. *CrossRef*
- Hair, J.F. (2010). Multivariate data analysis: a global perspective. Upper Saddle River, NJ: Person Prentice Hall.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2014). Pearson new international edition. Multivariate data analysis, Seventh Edition. Pearson Education Limited Harlow, Essex.
- Hasani, A., Mokhtari, H., & Fattahi, M. (2021). A multi-objective optimization approach for green and resilient supply chain network design: A real-life case study. Journal of Cleaner Production, 278, 123199–.*CrossRef*
- 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.
- Pallant, J. (2010). SPSS Survival Manual. A step by step guide to data analysis using SPSS (4th ed.). Melbourne: Open University Press.
- Paz, M. (1990). Theory and Computation. Structural Dynamics.
- Reyes, J. C., & Chopra, A. K. (2011). Three-dimensional modal pushover analysis of buildings subjected to two components of ground motion, including its evaluation for tall buildings. Earthquake Engineering & Structural Dynamics, 40(7), 789-806.
- 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*
- Saunders, M., Lewis, P., & Thornhill, A. (2019). Research methods for business students (7th ed.). Pearson Education.
- Schindler, P., & Cooper, D. (2014). Business research methods (12th ed.). McGraw-Hill.
- Tarafdar, M., & Qrunfleh, S. (2016). Agile supply chain strategy and supply chain performance: complementary roles of supply chain practices and information systems capability for agility. International Journal of Production Research, 55(4), 925–938. *CrossRef*
- Thode, H. C. (2002). Testing for normality. CRC press.
- Vizinger, T., & Zerovnik, J. (2018). Coordination of a Retail Supply Chain Distribution Flow. Tehnički Vjesnik, 25(5), 1298–1305. *CrossRef*
- Williams, B., Brown, T., & Onsman, A. Exploratory factor analysis: a five-step guide for novices. J Emerg Prim Health Care. 2010; 8 (3).[cited 2013 sept].
- Yusuf, Y., Menhat, M. S., Abubakar, T., & Ogbuke, N. J. (2020). Agile capabilities as necessary conditions for maximising sustainable supply chain performance: An empirical investigation. International Journal of Production Economics, 222(1), 1-50 *CrossRef*