How Firm Innovation Affect Competitive Advantage Concurrently with Leagile Strategy: An Empirical Analysis of Construction Companies

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Abstract

This research embarked on establishing the extent to which construction companies' supply chains in Nairobi City County-Kenya realized competitive advantage as a result of the implementation of leagile strategy, and firm innovation strategies. A total of 260 construction companies in Nairobi City County-Kenya were surveyed vide structured questionnaires. Data was evaluated vide various diagnostic tests and regression analysis to determine the relationships between the study variables. The intervening effects of firm innovation was further tested vide a stepwise approach proposed by Baron and Kenny in 1986. The results revealed that leagile strategy has a significant positive influence on competitive advantage. Equally, firm innovation has a positive significant influence on competitive advantage. Further tests showed that leagile strategy has a significant influence on firm innovation, which in turn significantly impact on competitive advantage of construction companies' supply chains. It was concluded from this study that firm innovation had a positive significant intervening influence on the association concerning leagile strategy, and competitive advantage in the construction companies' supply chains. The study outcome validates that leagile strategy, and firm innovation are strategic enablers of competitive advantage in the construction companies' supply chains. The leagile strategy, and firm innovation model is a key measure that might help policymakers, practitioners, as well as researchers in understanding achievement of competitive advantage in construction companies in developing economies like Kenya. The study had limitations emanating from the effects of COVID-19 Pandemic, which was a challenge during the data collection. Further studies are recommended to be conducted in other supply chains different from those of construction companies. Additionally, a similar study could be conducted to incorporate transport, and distribution companies in the construction companies' supply chains in Nairobi City County-Kenya.

Keywords: Competitive advantage, firm innovation, leagile strategy, supply chains, construction companies, Nairobi City County, Kenya

1. Introduction

Researchers have given prominence on the need for companies to reconfigure their processes to offer high quality products within a short time, and at low costs (Maganha et al., 2020; Ding et al., 2022). Furthermore, academics, and practitioners have advocated for the need to amalgamate the lean and agile methods to augment firm's innovation, and sustainable performance in turbulent environments (Ciccullo et al., 2018). Companies worldwide have spent money over time to increase the responsiveness, effectiveness, and efficiency of their production processes (AlShurideh et al., 2019). A look at extant literature reveals most studies have concentrated on examining the specific relationship between leagile strategy, and competitive advantage (Tanvir & Yoshi, 2012; Rahimnia, Moghadasian & Castka, 2009; Arasa, Mwaura, & Ngui, 2016; Oyombe et al., 2022); and between firm innovation, and competitive advantage (Nyeadi et al., 2018; Dowlatabadi & Saaneiyan, 2015; Mohammadian, 2014; Tidd et al., 2006;). These studies have suggested that singly, leagile strategy, and firm innovation leads to achievement of competitive advantage. Other related research has focused on examining the conceptual advancement of leagile systems (Naim et al., 1999; Mason-Jones et al., 2000; Galankashi & Helmi, 2016; Nayak & Choudhary, 2022), or on the application of leagile systems (Li et al., 2020). Yet, some scholars have advocated for an amalgamation of two or more strategies in the company (Krishnamurthy & Yauch, 2007; Denise, 2012).

There is a gap in literature on the influence of both leagile strategy, and firm innovation on achievement of competitive advantage in the construction companies' supply chains. No known study has tried to connect leagile strategy, firm innovation, and competitive advantage of construction companies' supply chains both in the developed, and developing economies. Hence, this study id driven by the need to seal the extant gap by investigating the influence of leagile strategy, and firm innovation on competitive advantage of construction companies' supply chains in Nairobi City County, Kenya.   This paper reasons that the implementation of both leagile strategy, and firm innovation by construction companies' supply chains in Nairobi City County, Kenya may present the sure way in the attainment of competitive advantage, and improving performance. Leagile strategy is the incorporation of both lean and agile methodologies by means of the customer order decoupling point (Naylor et al., 1999). Leagile strategy is capable of improving company performance (ForouzeshNejad, 2023), and achieving competitiveness in a cost-effective manner. The combination of lean and agile strategies into leagile support companies to confront speedy changes in the business environment and grow their market share (Galankashi & Helmi 2016; Li et al. 2020). Leanness aids in reducing the cost of production, enables commodities to be traded at lower prices than competitors, increases consumer fulfillment (Al-Dmour et al., 2021), and maximizes resource utilization (Al Kurdi et al., 2021). Companies rely on lean strategy to consistently and methodologically respond to business environmental changes to increase the output's value to survive (Al-Qudah, et al., 2022; Aburayya et al., 2020).

According to Buer et al. (2021), the lean system is associated with the waste reduction, value accumulation, employee empowerment, process rationalization, and constant improvement throughout the business processes. In challenging conditions where change is continuous and unpredictable, the agile strategy supports companies in becoming more competitive and successful (Shakhour et al., 2021). The companies maintain their production and delivery promptly to realize a higher-level order winner, and attain customer satisfaction (Alwan & Alshurideh, 2022). The agile approach aims at improving the company's response capability in a volatile business environment, with emphasis on cost, efficiency, speed, and sensitivity to unpredictable demand (Darvishmotevali et al., 2020; Mathiyazhagan et al., 2021). The mutual application of lean and agile strategies in manufacturing has been proven to boost business performance in terms of operations, finances, and market (Iqbal et al., 2020), alleviate the myriad problems associated with rapidly changing customer preferences in the competitive arena (Srinivasan et al., 2020), and creäte competitive advantage (Calatayud et al., 2019). Leagile strategy is the innovative, and strategic approach implemented by companies in their supply chains for attainment of competitive advantage (Jaya & Kumar, 2016; Cohen & Lee, 2020). Lean and agile strategies have the common objective of improving responsiveness in the supply chain (Raji et al., 2021). Lean and agile methodologies can be combined into leagile strategy in the construction companies' supply chains, leading to the achievement of competitive advantage (Oyombe et al., 2023).

Leagile manufacturing practices include flexibility, waste management, postponement, supply chain information sharing, and continuous improvement among others. Flexibility in the supply chain ensures lower costs of storage since large inventories are not retained in expectation of swelling demand (Mohammaddust et al. 2017). Hence, when demand rises, supply is generated in fulfilment such that on receiving a customer's requirements, they are satisfied within a given timeframe. That aspect of agile strategy ensures effective customer service delivery (Martins, 2020). Leagile strategy impacts positively on innovation performance through the mediation of dynamic capability, relational trust, and R&D management (Nagar, 2022). Furthermore, leagile strategy combined with innovation favorably affect overall company performance based on a study done among Indian MSMEs (Babber & Mittal, 2023).

Firm innovation is defined as the ability of an organization to develop and introduce new products and services as well as a constant fresh approach in addressing customers' wants and preferences (Kurtmollaiev et al. 2022). Firm innovation is the introduction of fresh or greatly upgraded products, processes, marketing techniques, and organizational methods (OECD & Eurostat 2018). Firm innovation is described as the invention within the company which has been commercialized and implemented, and is emerging to be critical for business competitiveness (Gustafsson et al., 2020). From the time of its conceptualization, innovation has been reflected as the basis of fresh value creation in businesses (Schumpeter, 1934). Firm innovation is the embracing of novel technology, introduction of fresh product lines, and adjustment of firm's operations such as the decision to outsource certain activities or open a new plant (Aghion et al. 2009; Ayyagari et al. 2007). The most critical factor for a company in realizing competitive advantage in a restless business environment is its capability to innovate, thus causing endless reaction to the market place changes (Slater, Hult, & Olson, 2010). The innovative capability in a company is entrenched with all the strategies, system and structure that support innovation (Gloet & Samson, 2016). According to Porter (1999), innovation facilitates firms to differentiate their

products, and exploit market opportunities and is considered the main competitive advantage creation component. Innovation in information technology supports leagile strategy to increase the firm's responsiveness (Qrunfleh & Tarafdar, 2013). Innovation in information technology is considered an important enabler contributing to achievement of competitive advantages with lean and agile strategies (Mandal 2018; Humdan et al., 2023; Dubey et al., 2018).

In order to ensure unceasing development, companies invest in research and development, leading to lasting growth, high-tech innovation, and increased competitiveness which are valuable sources of competitive advantage (Patel et al., 2019; Ruiqi et al., 2017). Research and development is the cradle of firm innovation especially through the innovative capability whereby companies access a combination of valuable resources propelling them to innovate (Laforet, 2013). Companies possessing superiority in resources and capabilities have greater innovative capability, and are a power to contend with in the competitive field due to their innovativeness. According to Atieh et al. (2016), such companies are observed as flexible, capable of leaping ahead of the competitors through enhancement of commodity quality, price, service delivery, advertising and marketing promotions. Companies possessing robust capabilities and resources in research and development are best placed to cultivate strong competitive advantages (Sun et al., 2021). Superiority of advanced technology, patent-protected products or processes, workforces, and strong trademark identity afford companies with differentiation strength leading to achievement of competitive advantage (Feng et al., 2023). Product/service innovation enables companies to expand into new market territories and accumulate supernormal profits (Bustinza et al., 2019).

Marketing innovation supports companies to better product positioning, fulfilment of consumer demands, and penetration of new markets thus increasing profitability.   Organizational innovation through significantly upgraded business practices, and stakeholder relationships enhances company performance. Competitive advantage is the capability of a company to influence its distinct capabilities and resources in providing valuable commodities to customers which enables them to attain advantageous competitive position than competitors in the industry (Lee et al., 2022).   According to Udriyah et al. (2019), competitive advantage is the pool of resources which offer an exceptional and higher position for companies to differentiate themselves from their rivals in the marketplace. A company has competitive superiority once it is capable of creating distinctive value or offering lower cost than its competitors (Barney, 2001). The key drivers of competitive advantage are unique resources and capabilities (Barney et al., 2021). Competitive advantage process incorporates superior skills which enable companies' differentiation strategies; superior resources strengthening production capacity, marketing, technology, and a strong distribution network; superior control for monitoring and evaluating business processes and results (Nainggolan, 2023). Competitive advantages stem from a company's strategic choices to capture opportunities in the marketplace (Friesenbichler & Reinstaller, 2022). According to Porter (2000), positional advantages results from cost leadership or product differentiation which delivers superior value to consumers. A company's ability to sustain its competitive advantage lies on the uniqueness of resources which are inimitable, and not substitutable (Mahdi et al., 2019). Porter (2000) asserts the two important sources of competitive advantages are lower cost of production and differentiation of products and services. Competitive advantage has also been explained from a supply chain stand point as being ahead of competitors in terms of the product price, quality, delivery dependability, innovation, and time to market (Li et al., 2006; Zhang, 2001; Koufteros et al., 2002).

Kenya's construction is among the industries driving economic growth, and immensely contributing to Gross Domestic Product (GDP) (Competition Authority of Kenya, 2017). Heavy investments have been made by the Kenyan government and counties to expand the general infrastructure (Mbusi, 2020). There are extensive investment prospects in urban renewal, low, and middle class housing construction, upgradation of slums, roads, commercial residents, manufacturing of construction resources and materials.   Construction sector in Kenya experienced tremendous growth as the total government expenditure on roads increased from Kenya Shillings 154.5 to 169.9 billion in 2018/2019. In addition, the construction industry grew by 4.5 per cent during the second quarter of 2022. Investments in real estate in the Nairobi City County increased to be worth more than Kenya Shillings 162.5 billion resulting in the growth of cement consumption to 9.5 million metric tonnes in 2022 up from 9.1 million metric tonnes in 2021 (Kenya National Bureau of Statistics, 2020 & Kenya Economic Outlook, 2020). The Standard Gauge Railway phase 2A from Nairobi to Naivasha was completed at a total cost of Kenya Shillings 150.0 billion in 2019. Kenya's construction sector in 2015 contributed 7 percent to GDP, registering 13.6 in value-added (Wanjira 2016), and is very crucial in providing employment (Masu & Wanyona, 2020). The construction industry employed 222,000 people in 2020 (KNBS, 2020). According to Kenya National Bureau of Statistics (2021), the yearly demand for housing exceeded supply by 156,000 units due to up-surging population.

However, the construction industry in Kenya faces various downturns and struggles with challenging times. The performance of construction companies in Nairobi City County, Kenya is dismal. The construction companies are faced with low profitability, and competitiveness caused by numerous factors (Budiwibowo et al., 2019). Companies in the construction industry in Kenya are among the greatest underachievers concerning cost, and schedule overruns, as well as standards ineffectiveness (Mwelu et al., 2021). Close to 50 per cent of construction projects in Nairobi City County, Kenya were unfinished, while 10 per cent of them were totally stalled (Ministry of Housing, Land and Urban Development, 2021). Approximately, one third of construction companies' projects in road either stall, underachieve, or experience financial, and time overstretch (KPMG, 2020). The phase one of 228 affordable housing program (AHP) in Kenya suffered time delays in completion where they were planned for completion in 2019, but were finalized in 2020 causing a time overrun (Koech, 2020). There is public uproar directed to owners, and professionals concerning frequent instances of buildings collapsing in Nairobi, Kenya are frequent (Buildafrique Consulting Limited, 2021). Most construction projects in Kenya are supervised by very qualified individuals, but fail due to lack of strategic planning and processes (Nzioka, 2019). Poor performance in the construction industry in Kenya has been attributed to; construction mismanagements, exploitation of mediocre materials in the construction, poor quality and workmanship, defective structural designs, and lack of proper supervision (Thuita, 2020). The construction developers experience a significant obstacle of credit squeeze because most financial institutions have become hesitant about extending credit for construction projects, and categorized clienteles in the sector as high risk (Kenya Economic Survey, 2023).

Cost of construction materials such as timber, steel, and cement increased tremendously due to inflation and the weakening value of the Kenya Shilling, eating into the profit margins and making it problematic for the companies to complete projects within the financial allocations (Kenya Economic Survey, 2023). Construction companies in Nairobi City County, Kenya are grappling with dismal performance due to major internal concerns on resources deployment, use of technological innovations, and application of outdated inefficient methods. Majority of the ventures initiated have high chances of costs increasing over time (Nyangilo, 2012).
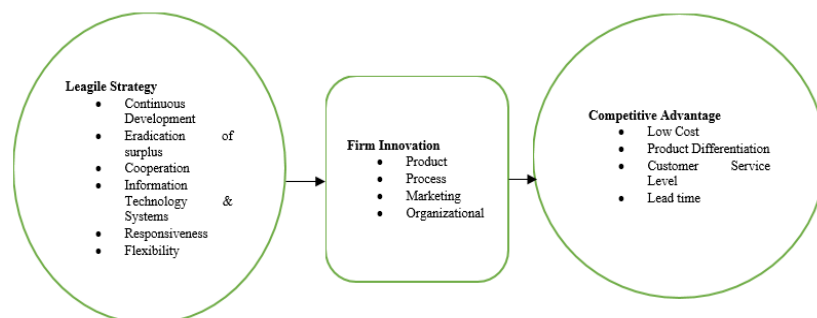

Figure 1. The conceptual model

2. Empirical Review

2.1 Leagile Strategy, Firm Innovation, and Competitive Advantage

This study is supported by Dynamic Capabilities (DC) Theory which offer clarifications of a sustainable competitive advantage that goes beyond the resource-based view which examined the resources in terms of valuable, rare, inimitable, and non-substitutable. DC theory goes beyond to explain how companies attain competitive success in the operating market. Those companies in ownership of dynamic capabilities are capable of leaping beyond the competition by integrating, building and reconfiguring different resources to respond to the fast-evolving business scenario (Teece et al, 1997; Augier & Teece, 2006). Network Theory which also anchor this study provides clarification about the innumerable cooperative relationships among the partners in the supply chain (Oliver, 1990). Network in a supply chain is complex depending on the relationships formed among partners (Haakansson & Ford 2002). Companies in the network perform activities and exchange resources whereby they become connected directly and/or indirectly. Once formed, these relations become special and companies enjoy direct communications leading to product customization and the capability to meet unique customer needs (Chang, Chiang, & Pai, 2012). Institutional theory was also considered in this study to provide the explanation regarding how change in companies is majorly determined symbolic actions and external influences and less via functional considerations (Meyer & Rowan, 1977).

Therefore, the innovative structures end up being adopted by new and existing organizations even if they do not improve efficiency. Ultimately the adopted innovations become legal mandates such that the inability of their implementation by organizations is tantamount to being unreasonable and neglectful (Tolbert et al., 2011). Najar (2022) studied lean-agile supply chain innovation performance by determining the mediating role of dynamic capability, innovation capacity, and relational embeddedness in Tunisia's 125 automotive components manufacturing companies. The study utilized the structural equation modelling approach for analysis revealing the importance of the mediating role of the dynamic capability, relational trust, and R&D management in fostering the impact of lean-agile supply chain performance. The study utilized resource based view as the anchoring theory, the structural equation modelling for data analysis, and was conducted in industry different from the current investigation. Hashem and Aboelmaged (2023) studied leagile manufacturing system adoption in the perspective of technological, organizational, and environmental drivers in an emerging economy. The study utilized multiple regression in data analysis unearthing that organization capacity, environmental uncertainty, and relative advantage reveal the most significant positive relationships with the leagile systems adoption. Complexity and resistance to change exhibited significant negative associations. Unpredictably, firm size unveils no significant effect on the adoption of leagile systems. Although the study employed similar research, and information analysis methodologies, it was conducted in manufacturing firms in Ukraine different from the current study carried out in construction companies' supply chains in Nairobi, Kenya.

Shah et al. (2023) developed a theoretical resource and leagile strategy model to empirically assess business operations for performance improvement. It was especially for understanding leagile strategy for increasing firm performance. The study was conducted in apparel, and textile industry in Pakistan, utilizing Smart PLS for data analysis. The outcome showed that supply chain manager, integration, customer focus, cost leadership, and leagile strategy positively impact apparel mill performance. It was further revealed that demand uncertainty moderates the relationship regarding leagile strategy and apparel mill performance, and leagile mediates between resources and performance. There was a conceptual difference between the study and the current investigation because resource was the employed as the independent variable, and leagile strategy, the mediating one. Although the investigation assessed leagile strategy, it employed performance as the independent variable different from the current study which examined the influence of both leagile strategy, and firm innovation on competitive advantage in construction companies' supply chains in Nairobi, Kenya.

Farida and Setiawan (2022) explored the effect of business strategies to improve the competitive advantages of small and medium enterprises (SMEs) in construction and real estate industry in Indonesia. Using business performance and innovation as the mediating variables, the study obtained a sample of 150 SMEs in Indonesia, and results revealed that business strategies have positive significant influence on business performance, innovation, and competitive advantage. Additionally, business performance, and innovation were found to mediate the relationship between business strategies, and competitive advantages. The study focused on SMEs in Java Island who receive assistance from Bank Indonesia SMEs which was a different context, and economy from Kenya, and could yield dissimilar outcomes. The current study looked at all sizes of construction companies' supply chain members including manufacturing, contractors, and property developers. Furthermore, the respondents of the study were owners of construction and real estate SMEs different from the current research whose respondents were supply chain directors and managers. The current study's focus on firm innovation as the intervening variable in the association regarding leagile strategy, and competitive advantage deviated from the reviewed study. Anuntarumporn1 and Sorhsaruht (2022) did a study in Thailand to examine how quality management (QMA), strategy (STR), and innovative capability (INC) influence the competitive advantage of a Thai information communication technology (ICT) firm (COA) through a survey involving 431 owners and managers working in ICT enterprises. Data was collected vide questionnaires, and seven-level opinion survey posted on google forms. Structural equation model (SEM) path analysis using LISREL 9.1 was used for analysis revealing that quality management, strategy, and innovative capability influence competitive advantage. However, the study was conducted in a different context and utilizing dissimilar analysis methodology. Additionally, the current study different concepts of leagile strategy, and firm innovation and their influence on competitive advantage which could present different outcomes. Almrshed, Jasim and Hassan (2023) examined the effect of Innovation Management on Sustainable Competitive Advantage in Contemporary Organizations through quantitative survey methodology from 245 SMEs in Nigeria's manufacturing sector. The study employed partial least squares structural equation modelling to analyze the information gathered. The findings show that SMEs in the Nigeria's manufacturing sector would profit from a rise in customer satisfaction achieved via the introduction of innovative competitive supplementary cost approaches and technical progress. Though utilizing survey methodology, the current study determined how both leagile strategy, and firm innovation influence competitive advantage of construction companies' supply chains.

3. Methodology

3.1 Population, Sample & Unit of Analysis

The targeted population of the study is 4,015 construction companies' supply chains in Nairobi City County, Kenya. The study involved three different categories of construction companies namely; contractors, 3,787; Manufacturing. Construction Companies, 112; Property Developers, 116. Unit of analysis is represented by the individual entity measured by the study variables (Salkind, 2010). Unit of analysis can be defined as the entity described by the data collected for the purpose of addressing the research problem, about which the analysis is conducted and defines the boundaries of what is to be examined or ignored in the study (Ritella et al., 2020). Khan (2014) postulates unit of analysis is important because it is the basis of the entire research. In this study, the unit of analysis consists of 4,015 individual construction companies registered in Nairobi City, County, Kenya. The population, and sample size details are shown in table 1.

Table 1. Size of population, and sample size

Categories		Population	Sample
1.	Contractors	3,787	305
2.	Manufacturing Construction companies	112	9
3.	Property Developers	116	9
Totals		4015	323

Empirical information was gathered through the survey vide questionnaires which were distributed to supply Chain/Procurement managers and directors or their representatives in the 323 construction companies sampled. This investigation utilized stratified random sampling procedure whereby first the proportions were determined, then simple randomization of the sample within each stratum was executed until the proportionate sub-sample size is realized. Mugenda and Mugenda (2003), explains that a representation of at least 70% of the population of study is sufficient to give reliable and valid results. To obtain the number of firms to be sampled from these 4,015 firms, the Mugenda and Mugenda (2003) formula for calculating sample size in social science research has been utilized, given as:

$$n = \frac{z^2\, p\left(1-p\right)}{d^2}$$

Where;

n = sample size

z = z-score at confidence level α = 0.05 (which implies z = 1.96)

p = inclusion proportion or probability which in this case is 70%

d = permissible marginal error (the level of statistical significance, set at α = 0.05).

Thus the sample size is as follows;

$$n = \frac{1.96^2 \times 0.7\left(1-0.7\right)}{0.05^2} = 323$$

The proportional allocation of stratum sample sizes via stratified random sampling helped in determining the number of firms in each stratum as follows:

$$\mathbf{n_i = n\frac{N_i}{N}}$$

Where;

$n_i = $ Number of firms to be sampled from each stratum.

n = Overall sample size, which is 323.

$N_i = $ Number of firms in the given stratum.

$N=$ Number of firms from the sampling frame.

Table 2. Sample size for the three categories

Stratum	Population size	Calculation	Sample size
Construction companies (NCA1-8 Contractors, 2018)	3,787	3787×323/4015	305
Construction companies (KAM members 2018)	112	112×323/4015	9
Construction companies (KPDA members 2019)	116	116×323/4015	9
Totals	4015		323

The respondents who are in ownership of the crucial knowledge are best placed to offer statistical information and operationalize visionary ideals (Holden & Lynch, 2004). Each questionnaire was formulated in a five-point Likert-type scale with denotation for (1) Very small extent (2) Small extent (3) Moderate extent (4) Large extent (5) Very large extent. Information gathered was analyzed vide the statistical Package for Social Sciences (SPSS) version 22 producing both statistical, and descriptive reports concerning the mean, standard deviation, frequencies, and percentages. Furthermore, regression and correlation analyses methods were employed in the study. The two null hypotheses in the study were expressed as:

H_{O1}: There is no significant relationship between leagile strategy and competitive advantage of construction companies' supply chains in Nairobi City County, Kenya

H_{O2}: Firm innovation has no significant intervening influence on the relationship between leagile strategy and competitive advantage of construction companies' supply chains in Nairobi City County, Kenya. Table 3 shows a summary of how the hypotheses were tested.

Table 3. Summary of Hypotheses Testing

Research Objectives	Hypothesis	Linear Regression Model	Interpretation of results
Research Objective 1: To interrogate the influence that leagile strategy has on competitive advantage of construction companies' supply chains in Nairobi City County, Kenya.	Hypothesis 1: H_{O1}: There is no significant relationship between leagile strategy and competitive advantage of construction companies' supply chains in Nairobi City County, Kenya.	$Y= \beta_0 + \beta_1 X + \varepsilon$ Where: $Y=$ Competitive advantage; $\beta_0=$ intercept constant; $\beta_1 =$ regression coefficient for leagile strategy $X =$ Leagile Strategy $\varepsilon=$ random error term	H_o: $\beta_1 = 0$ H_a: $\beta_1 \neq 0$ Where β_1=regression coefficients for Leagile Strategy Reject H_o if p<0.05, Otherwise fail to reject the H_o The higher the R^2 value, the higher the extent of influence If p-value <0.05, then the influence is significant
Research Objective 2: To explore the influence of firm innovation on the relationship between leagile strategy and competitive advantage of construction companies' supply chains in Nairobi City County, Kenya.	Hypothesis 2: H_{O3}: Firm innovation has no significant intervening influence on the relationship between leagile strategy and competitive advantage of construction companies' supply chains in Nairobi City County, Kenya.	(i) $Y=\beta_0 + \beta_1 X + \varepsilon$ (ii) $M_2 =\beta_0 + \beta_2 X + \varepsilon$ (iii) $Y =\beta_0 + \beta_3 M_2 + \varepsilon$ (iv)$Y= \beta_0 + \beta_4 X + \beta_5 M_2 + \varepsilon$ $Y=$ Competitive advantage; $\beta0=$ intercept constant; $\beta_i =$ corresponding regression coefficients for leagile strategy X and firm innovation M_2 in the models $\varepsilon =$ random error term	H_o: $\beta_i = 0$ H_a: $\beta_i \neq 0$ Where β_i are the respective regression coefficients in the three models Reject H_o whenever p<0.05 in the three models, Otherwise fail to reject the H_o The higher the R^2 value, the higher the extent of influence If p-value <0.05, then the influence is significant

Furthermore, reliability and validity of the research instrument were examined because they are of great significance for good research (Haradhan, 2017). Validity and reliability raise the level of transparency and decrease opportunities of researcher bias (Singh et al., 2014). The study examined validity via Kaiser-Meyer-Olkin

(KMO) test, and reliability through Cronbach Alpha Coefficient. Additionally, the researcher conducted several analytical checks prior to information analysis to ensure gathered data were in congruence with the underlying assumptions of the linear regression. Multicollinearity, autocorrelation, normality and homoscedasticity were the diagnostic tests applied to pre-test the data in this study. Multicollinearity exists where there is a high degree of correlation between predictor variables in a multiple regression model (McCave & Sincich, 2018). The study implemented the Field (2009) to test multicollinearity. Autocorrelation describes the presence of association between values of the measured variable at different times (Gujarati & Porter, 2009). The autocorrelation was checked vide Autoregressive Integrated Moving Average (ARIMA) approach. Homoscedasticity assumes the variability in scores for one continuous variable to another is approximately the same at all values (Tabachnick & Fidel, 2007). In order to examine the homoscedasticity, Levene (1960) test was embraced. According to Kinuu (2014), the key assumption in regression analysis model is a normal data distribution. Normality of the data distribution was measured in the current study using Shapiro-Wilk test.

4. Results and Discussion

Descriptive Results: The response rate was 80.50 percent whereby a total of 260 responses were received from the surveyed construction companies in Nairobi City County. A tabular presentation of the descriptive statistical results is in Table 4-9.

Table 4. Level of education of respondents

Level of Education	Master's Degree	Bachelor's Degree	Post Graduate Diploma	Diploma	Certificate
Percentage(%)	6.2	47.7	0.4	45.4	0.4
Ranking	3	1	4	2	4

Table 5. Position of the respondents

Position of Respondents	Director/ CEO/MD	Manager/ Site Supervisor	Sales Executive	Engineer	Others
Percentage(%)	15	74.6	5.4	0.8	4.2
Ranking	2	1	3	5	4

Table 6. Years of service of the respondents

Years of Service	Below 1	Between 1 & 3	More than 3
Percentage(%)	28	37	35
Ranking	3	1	2

Table 7. Ownership of the company

Company Ownership	Multinational	Regional	National	Local
Percentage(%)	1	11	51	37
Ranking	4	3	1	2

Table 8. Duration of operation

Duration of Operation (Years)	Less than 1	1-5	6-10	More than 10
	1	11	51	37
Ranking	4	3	1	2

Table 9. Area of specialization

Area of Specialization	No. of companies	Percentage (%)	
Building Works	91	35	
Road Works	40	15.4	
Mechanical Engineering Service	17	6.5	
Water Works	31	11.9	
Electrical Engineering Service	14	5.4	
All of these	17	6.5	
Building and Road Works	29	11.2	
Painting Works	1	.4	
Manufacturing	9		3.5
Supply of Industrial & Construction Goods	2	.8	
Building and Water Works	1	.4	
Property Management	8		3.0
Total	260	100	

The above outcomes demonstrated that majority of the respondents were well educated to the level of bachelor's degree, and had been in the company's service for more than one year. Additionally, 89.6 percent of the respondents were directors and managers who recognizes well regarding current and historical managerial practice associated with leagile strategy, firm innovation, as well as competitive advantage in the construction companies. Majority of the construction companies in Nairobi City County, Kenya were nationally owned, and 88 percent of them had been operating their businesses for six years and above showing they had matured in the industry. Furthermore, the construction companies are highly specialized in different areas such as building, road, water works, mechanical, and electrical engineering, manufacturing as well as property development among others. This is a strong indication of high level of fragmentation in the industry which calls for the implementation of supply chain strategies concerned with efficiency, responsiveness, synchronization, information sharing, and technology systems.

Table 10. Responses on leagile strategy

Variables	Mean	SD	CV%	Sk
The company keeps a minimum inventory level to eliminate waste	3.71	.851	22.9	-.28
The company focuses on the highest priority goals to eliminate waste	3.99	.740	18.5	-.16
The company delivers products and services that conform to customers' quality requirements	4.18	.781	18.7	-.57
Company practices continuous quality improvement	4.19	.762	18.2	-.45
The company practices economies of scale to achieve volume discounts	4.18	.816	19.5	-.77
Company maintains a large volume of managerial expertise	4.14	.863	20.8	-.56
The company maintains cooperation with suppliers and all service providers	4.19	.767	18.3	-.34
Company strategically plans its activities in advance	4.22	.752	17.8	-.55
Company operates using IT and market intelligence	4.17	.811	19.4	-.49
The company quickly responds to changes in customer's requirements	4.09	.793	19.4	-.30
The company maintains a flexible workforce, processes, and technologies	4.30	.801	18.6	-.77
Average	4.12	0.79	19.3	-.48

From table 10, the average mean score of the eleven inquiries conveyed to assess the extent to which leagile strategy leads to competitive advantage was 4.12 revealing a general agreement among respondents that leagile strategy leads to competitive advantage in construction companies' SCs in Nairobi City County.

Table 11. Responses to firm innovation

Variables	Mean	SD	CV%	Sk
Company develops and implements new products continuously	3.89	.891	22.9	-.340
Company continuously develops new processes	4.08	.736	18.0	-.531
The company uses new advertisement and promotional methods for its products and services	4.13	.869	21.0	-.826
Company uses new techniques of delighting customers continuously	4.11	.828	20.1	-.704
Company continuously carries out research	4.12	.886	21.5	-1.01
Company continuously acquires new IT system	4.35	.799	18.4	-1.08
Company continuously create culture that encourage suggestion of new ideas	4.02	.829	20.6	-.439
Company continuous create organization structure that matches corporate and innovation goals	4.33	.790	18.2	-1.23
Average	4.13	0.83	20.11	-0.77

The responses in Table 11 show that the average mean score of the eight statements utilized to assess the extent to which firm innovation is adopted in these construction companies was 4.13. This is an indication of a general agreement that firm innovation was practiced in the construction companies' supply chains in Nairobi-Kenya.

Table 12. Responses on competitive advantage

Variables	Mean	SD	CV%	Sk
The company offers comparatively lower prices than competitors	3.86	.891	23.1	-.31
The company has been reducing its overall costs more than its competitors	3.88	.850	21.9	-.42
The company focuses on offering benefits to customers more than its competitors	4.17	.738	17.7	-.35
The company offers high product variety than its competitors	4.04	.760	18.8	-.33
The company offers products and services with unique features than competitors	4.06	.776	19.1	-.30
The company offers products and services with superior qualities than competitors	4.18	.782	18.7	-.38
The company offers an especially high service level to its customers	4.13	.809	19.6	-.42
Company ensures speedy delivery to customers	4.25	.731	17.2	-.48
Company maintains short lead times	4.37	.720	16.5	-.74
Average	4.10	0.89	19.2	-0.31

The average mean score of the nine statements applied to determine the extent to which competitive advantage was realized in the construction companies was 4.10. This shows a general agreement among the respondents of construction companies surveyed that competitive advantage is achieved. The realization of competitive advantage in the construction companies' supply chains is mainly via offering products and services with exceptionally superior quality to customers, shorter lead times, comparatively lower prices, high product variety, and high service level to customers, than competitors. Offering especially high service levels to customers leads to repeat purchases, development of long-term relationships, improves employee morale, creates personal positive connections with customers, and therefore ensures competitive advantage. Offering customers' products and services with exceptionally superior quality helps companies create trust, earn customer loyalty, establish brand recognition, and manage cost reduction emanating from reduced product returns, defects, and losses. Furthermore, it encourages the customers to prefer to buy the company's product and hence increases the revenue, leading to competitive advantage via enhanced competitiveness and increased market share.

Inferential Results: Outcomes of the diagnostic tests indicated there was reliability of the research instrument because a significant Cronbach's alpha coefficient of 0.834 was obtained. Equally, validity of the research instrument which was examined vide Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity was confirmed because the resultant value was 0. 712, significant, and more than 0.5. Additionally, Bartlett's test of sphericity indicated a p-value of 0.000 which was less than 0.05, proving validity. The Durbin-Watson test values obtained; 1.885 for direct effect model, and 1.995 for the joint effect model, fell between 1.5 and 2.5 revealed there was no autocorrelation in the responses. The Variance Inflation Factors (VIF) value observed was less than 5 and the tolerance values of approximately 1. Field (2009) recommends VIFs below 5 and tolerance above 0.2 as a more accurate measure of multicollinearity. Therefore, from the findings there was no multicollinearity among the independent variables; leagile strategy, and firm innovation. The outcomes showed there was homoscedasticity because the probability for Levene's statistic was greater than 0.05. The foregoing checks were key in

determining whether the study variables were suited for regression modeling. Normality test vide Shapiro-Wilk showed that there was normal data distribution since the corresponding p-value was 0.118, greater than 0.05. The null hypothesis that the data is normally distributed was not rejected. Regression Modeling: Statistical methods of regression models, and correlation analyses were utilized to test the hypothesis H_{O1} & H_{O2}. Pearson's correlation coefficient (r) was utilized to determine the relationship between the variables, Coefficient of determination R^2 value was used to explain the proportion of the variance in the independent variable, and Baron and Kenny's (1986) stepwise moderation approach was employed to determine the intervening (mediating) influence of firm innovation on the association regarding leagile strategy, and competitive advantage.

Firstly, the direct effect model of regression analysis was used to examine the influence of leagile strategy on competitive advantage. $CA = \beta_0 + \beta_1 LS + \varepsilon$.

Where:

CA = Competitive Advantage (Dependent variable).

LS = Leagile Strategy (Independent variable).

β_0 = Regression constant.

β_1 = Regression coefficient for Leagile Strategy.

ε = Error term.

Table 13. Results of Regression Coefficients: Leagile Strategy and Competitive Advantage

Regression Coefficients				
	Beta	Std. Error	t-statistics	Sig.
(Constant)	.00036	.060	.006	.995
Leagile Strategy	.261	.060	4.350	.000

Notes. Dependent Variable: Competitive Advantage; Predictors: (Constant), Leagile Strategy.

The outcomes showed that leagile strategy had a significant positive influence on competitive advantage. Regression Coefficient of leagile strategy was a positive 0.261, and significant with p-value = 0.000. The P-value of 0.000 shows that leagile strategy had a significant influence on competitive advantage of the construction company because it's less than 0.05. The resultant equation was presented as follows: Competitive Advantage = 0.00036 + .261 LS. Secondly, the mediating influence of firm innovation on the relationship regarding leagile strategy, and competitive advantage was verified utilizing the stepwise approach suggested by Baron and Kenny in 1986. In this approach, the existence of relationships among the variables is established first, and then their significance is determined. The existence of a non-significant relationship is an indication of the absence of mediation. Baron and Kenny (1986) posits that a variable has an intervening influence if all regression coefficients in the four steps of regression modeling are significant at a 5% level of significance. The mediation effects of firm innovation denoted as M_2 were tested vide four steps:

Step 1: Conducting a simple regression analysis of LS predicting CA .

(i) $CA = \beta_0 + \beta_1 X + \varepsilon$

The Step 1 model corresponds to the direct effects model, which was done while testing the direct relationship between leagile strategy and firm innovation (see table 11).

Step 2: Conducting a simple regression analysis with LS predicting M_2

(ii) $M_2 = \beta_0 + \beta_2 X + \varepsilon$

Step 3: Conducting a simple regression analysis with M_2 predicting CA

(iii) $CA = \beta_0 + \beta_3 M_2 + \varepsilon$

Step 4: Conducting a multiple regression analysis with LS and M_2 predicting CA

(iv) $CA = \beta_0 + \beta_4 X + \beta_5 M_2 + \varepsilon$

Where

CA = Competitive Advantage (Dependent variable)

LS= Leagile Strategy (Independent variable)

M_2= Firm Innovation (mediating variable)

β0 = Intercept constant

$β_i$ = Corresponding regression coefficients for leagile strategy X

Ɛ = Random error term

Results of the regression analysis revealed that the regression coefficients of leagile strategy and firm innovation in all the four steps were significant as shown in the table 13.

Table 13. Mediation effect of firm innovation on the relationship between leagile strategy, and competitive advantage

Steps		Leagile Strategy	Firm Innovation	R^2
Step 1	Coefficient	0.261	-	
(Base model)	P-value	0.000	-	0.068
Step 2	Coefficient	0.250	-	
	P-value	0.000	-	0.063
Step 3	Coefficient	-	0.343	
	P-value	-	0.000	0.118
Step 4	Coefficient	0.187	0.296	
	P-value	0.002	0.000	0.151
Significance of Change		P-value = 0.002, 0.261 > 0.187	P-value = 0.00, change significant at α = 0.05	0.083 (0.151-0.068)

It was discovered that firm innovation had a mediation influence in the relationship between leagile strategy and competitive advantage. The null hypothesis H_{02}: Firm Innovation has no significant mediation influence on the relationship between Leagile Strategy and Competitive Advantage was rejected. In step one, the study revealed that leagile strategy had a positive significant influence on competitive advantage because the regression coefficient of leagile strategy was positive 0.261, and a corresponding P-value = 0.000 < 0.05. In step two, the regression model established there was a relationship between leagile strategy, and firm innovation ($M_2 = β_0 + β_2X + Ɛ$) where it was revealed that leagile strategy had a significant positive influence on firm innovation because the regression coefficient of leagile strategy was a positive 0.25, and the corresponding P-value = 0.000 < 0.05.

Step three of the regression model examined the effect of firm innovation on competitive advantage where it was unearthed that firm innovation had a positive significant influence on competitive advantage because the regression coefficient of firm innovation was positive 0.343, and corresponding P-value = 0.000 < 0.05. Lastly, step four examined the effect of leagile strategy, and firm innovation on competitive advantage. The study revealed that leagile strategy, and firm innovation had positive significant influence on competitive advantage because the regression coefficients for leagile strategy and firm innovation were 0.187 and 0.296 respectively. Furthermore, the corresponding p-values of 0.020 for leagile strategy, and 0.000 firm innovation were less than 0.05 and therefore significant. The fact that leagile strategy had a significant influence on firm innovation, which in turn had a significant effect on competitive advantage was proof of the existence of the mediation effect. Testing of hypothesis involved determining the significance of the mediating influence of firm innovation on the association regarding leagile strategy, and competitive advantage.

5. Discussion and Conclusions

The study concluded that leagile strategy significantly influence competitive advantage of construction companies' supply chains. This finding support other earlier ones such as (Arasa, Mwaura & Ngui, 2016; Tanvir & Yoshi, 2012; Jaya & Kumar, 2016; Cohen & Lee, 2020; Shah et al., 2023). The results also showed that firm innovation has significant mediation effect on the relationship between leagile strategy and competitive advantage. Hence the study's outcomes shed similar facts as other findings of (Nyeadi et al., 2018; Nafula et al., 2017; Jaya & Kumar, 2016; Cohen & Lee, 2020). The execution of both leagile strategy, and firm innovation help companies realize competitive advantage within the company as well as in their supply chains. It of essence that construction companies should embrace leagile strategy, and firm innovation to achieve competitive advantage. Construction companies implementing leagile strategy should involve in continuous improvement which requires investment in

research and development leading to lasting growth, high-tech innovation, increased competitiveness, and which are valuable sources of competitive advantage (Ruiqi et al., 2017). Research and development is the cradle of firm innovation through the continuous processes requiring innovation capability propelling companies to innovate (Laforet, 2011) to attain competitive advantage.

5.1 Implications to Theory

Studying the association regarding leagile strategy, firm innovation, and competitive advantage shows the importance of amalgamation of two or more strategies in the company (Krishnamurthy & Yauch, 2007; Denise, 2012). Moreover, combining the use of leagile strategy, and firm innovation in pursuit of competitive advantage supports the provisions of dynamic capabilities theory which postulates that businesses with the ability to reconfigure their resources and capabilities in line with the recognized opportunities and environmental change are capable of creating a competitive advantage (Teece et al., 1997; Teece, 2012). The study's findings increase the existing knowledge regarding the application of leagile strategy, and firm innovation towards the realization of competitive advantage in construction companies. It is important to note there could be other factors besides leagile strategy, and firm innovation responsible contributing to the achievement of competitive advantage in construction companies' supply chains.

5.2 Implications to Practice

The supply chain directors, managers, and practitioners need to embrace the adoption of leagile strategy and firm innovation alongside their competitive strategy. Firm innovation contributes to the achievement of competitive advantages through the introduction of new products which help maintain market shares and improve profitability. A successful process innovation facilitates development of better products, and marketing activities within the company. Process innovation help companies reduce the cycle time, leading to swift delivery services, and shorter lead times which culminates in customer satisfaction, and repeat purchases. Process innovation aids proper business recording system, addressing customer needs with tailor made decision with advanced technological platform which leads to realization of competitive advantages. The construction companies need to introduce new products and processes as an effective innovative solution. The introduction of new product/service innovativeness also leads to the substitution of outdated products and processes which shortens production time and speed up new product development thereby helping a company to be ahead of competitors. Marketing innovations benefits the construction companies in better addressing the customer needs, penetration of the new markets, positioning the new company products, increasing sales, and creating sustainable growth. Organizational innovation aids construction companies to reduce costs of transaction, and administration thereby satisfaction in the workplace. Construction companies are hence encouraged to renew their organizational systems, procedures, coordination, team cohesiveness, collaboration, information, and knowledge which help them to exploit changes in the business environment to achieve competitive advantage and growth.

5.3 Implications to Policy

The policymakers in government and all construction industry players may benefit from the findings that leagile strategy, and firm innovation influence competitive advantage. Some of the institutions which influence policy in the construction industry in Nairobi City County, are the National Construction Authority, Nairobi City County, Kenya Association of Manufacturers, Competition Authority of Kenya, Kenya Bureau of Standards, and Kenya Property Developers Association. The outcomes of this study could influence organizational reforms in the construction industry in Kenya and beyond. These findings help in increasing the awareness of the policymakers of their capability to alleviate myriad challenges emanating from the tumultuous business environment, achievement of competitive advantages, and superior organizational performance through the adoption of appropriate strategies such as leagile strategy, and firm innovation with appropriate competitive strategy. The study demonstrates to the policymakers in oversight institutions the benefits of implementing a blend of strategies in their organizations and their supply chains. This study benefits the government by contributing to the achievement of Kenya's vision 2030 as its findings increase the generation, utilization, and commercialization of research and development in the construction industry.

5.4 Contribution to New Knowledge

There is novel empirical proof ratifying the existence of the intervening influence of Firm Innovation on the relationship between leagile strategy and competitive advantage of construction companies' supply chains in Nairobi City County. Results of this study show that firm innovation partially influences the relationship between leagile strategy and competitive advantage through factors such as; continuous design of new techniques of delighting the customer, carrying out research and development, creating an organizational

structure that matches corporate and innovation goals, and encouraging a culture allowing employees to suggest new ideas.

6. Limitations of the Study

The leading purpose of the current investigation was to assess the influence of leagile strategy, and firm innovation on advantage of construction companies' supply chains in Nairobi City County. Several limitations could be attributed to this study. A sample size of 323 companies was targeted for this study to fill the questionnaires. At the time of data collection, the COVID-19 pandemic was at its peak and several restrictions on the access of premises of companies targeted by the researcher. Additionally, the fact that responses were only to be provided by individuals who were procurement/supply chain managers or directors or those performing those roles in the targeted companies may have introduced an element of common method bias. Nonetheless, the researcher confirms that these limitations did not compromise the quality of the research design, output, and subsequent development of the research thesis.

7. Recommendations

These findings of this study can be replicated in other industries and supply chains. The future research should focus on unearthing other factors contributing to the achievement of competitive advantage besides leagile strategy, and firm innovation in the construction companies' supply chains. In the future researchers should consider the use of multiple respondents to enable comparison of views in the firm. It could also be prudent if, in the future, the questionnaires are accompanied by a respondent interview.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Canadian Center of Science and Education.

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References

Aburayya, A., Alshurideh, M., Alawadhi, D., Alfarsi, A., Taryam, M., & Mubarak, S. (2020). An Investigation of the Effect of Lean Six Sigma Practices on Healthcare Service Quality and Patient Satisfaction: Testing the Mediating Role of Service Quality in Dubai Primary Healthcare Sector. *Journal of Advanced Research in Dynamical and Control Systems, 12*(8), 56-72.

Aghion, P., Blundell, R., Griffith, R., Howitt, P., & Prantl, S. (2009). The effects of entry on incumbent innovation and productivity. *The review of economics and statistics*, *91*(1), 20-32.

Aghion, P., Richard, B., Rachel, G., Peter, H., & Susanne, P., (2004). Entry and Productivity Growth: Evidence from Microlevel Panel Data. *Journal of the European Economic Association, 2*(2-3), 265-276.

Al-Dmour, N. A., Ali, L., Salahat, M., Alshurideh, M., Alzoubi, H. M., Ghazal, T. M., & Chabani, Z. (2023). Information Systems Solutions for the Database Problems. *Stud. Comput. Intell.*, 703-715.

Almrshed, S. K. H., Tuckova, H. M. J. Z., & Hassan, A. S. (2023). The Effect of Innovation Management on Sustainable Competitive Advantage in Contemporary Organizations. *Journal of Law and Sustainable Development*, *11*(11), e1980-e1980.

Alshurideh, M., Al-Hadrami, A., Alquqa, E., Alzoubi, H., Hamadneh, S., & Kurdi, B. (2023). The effect of lean and agile operations strategy on improving order-winners: Empirical evidence from the UAE food service industry. *Uncertain Supply Chain Management*, *11*(1), 87-94.

Alwan, M., & Alshurideh, M. (2022). The effect of digital marketing on value creation and customer satisfaction.

International Journal of Data and Network Science, 6(4), 1557-1566.

Anuntarumporn, N., & Sorhsaruht, P. (2022). The impact of innovation capability of firms on competitive advantage: An empirical study of the ICT industry in Thailand. *The Journal of Asian Finance, Economics and Business*, *9*(2), 121-131.

Arasa, R., Mwaura, R., & Ngui, T. (2016). The relationship between supply chain strategies and achievement of competitive advantage in seed manufacturing companies in Nairobi county, Kenya. *International Journal of Science and Research*, *5*(1), 358-364.

Atieh, A. M., Kaylani, H., Al-Abdallat, Y., Qaderi, A., Ghoul, L., Jaradat, L., & Hdairis, I. (2016). Performance improvement of inventory management system processes by an automated warehouse management system. *Procedia Cirp*, *41*, 568-572.

Augier, M., & Teece, D. J. (2006). Understanding complex organization: the role of know-how, internal structure, and human behavior in the evolution of capabilities. *Industrial and Corporate Change*, *15*(2), 395-416.

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2007). *Firm innovation in emerging markets: The roles of governance and finance*. World Bank.

Babber, G., & Mittal, A. (2023). Achieving sustainability through the integration of lean, agile, and innovative systems: implications for Indian micro small medium enterprises (MSMEs). *Journal of Science and Technology Policy Management*.

Barney, J. B. (2001). Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of management*, *27*(6), 643-650.

Barney, J. B., Ketchen Jr, D. J., & Wright, M. (2021). Resource-based theory and the value creation framework. *Journal of Management*, *47*(7), 1936-1955.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and Social Psychology*, *51*(6), 1173.

Buer, S. V., Semini, M., Strandhagen, J. O., & Sgarbossa, F. (2021). The complementary effect of lean manufacturing and digitalisation on operational performance. *International Journal of Production Research, 59*(7), 1976-1992.

Bustinza, O. F., Gomes, E., Vendrell-Herrero, F., & Baines, T. (2019). Product-service innovation and performance. *R&D Management*, *49*(1), 33-45.

Calatayud, A., Mangan, J. and Christopher, M. (2019). The self-thinking supply chain. *Supply Chain Management: An International Journal*, *24*(1), 22-38.

Chang, C. W., Chiang, D. M., & Pai, F. Y. (2012). Cooperative strategy in supply chain networks. *Industrial Marketing Management*, *41*(7), 1114-1124.

Ciccullo, F., Pero, M., Caridi, M., Gosling, J., & Purvis, L. (2018). Integrating the environmental and social sustainability pillars into the lean and agile supply chain management paradigms: A literature review and future research directions. *Journal of cleaner production*, *172*, 2336-2350.

Cohen, M. A., & Lee, H. L. (2020). Designing the right global supply chain network. *Manuf. Serv. Oper. Manag. 22*, 15-24.

Competition Authority of Kenya. (2017). The construction industry analysis of the state of competition. Retrieved February 6, 2019, from https://www.cak.go.ke/sites/default/files/Construction%20Industry%20in%20Kenya.pdf

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297-334.

Darvishmotevali, M., Altinay, L., & Köseoglu, M. A. (2020). The link between environmental uncertainty, organizational agility, and organizational creativity in the hotel industry. *International Journal of Hospitality Management, 87*, 102499. https://doi. org/10.1016/j.ijhm.2020.102499

Denise, R. (2012). Lean Production and Agile Organization: The Link between Supply Chain and Sustainable Development.

Dhillon, H. K., Zaini, M. Z. A., Quek, K. F., Singh, H. J., Kaur, G., & Rusli, B. N. (2014). Exploratory and confirmatory factor analyses for testing validity and reliability of the malay language questionnaire for urinary incontinence diagnosis (QUID). *Open Journal of Preventive Medicine*, *4*(11), 844-851.

Dubey, R., Altay, N., Gunasekaran, A., 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, 38*(1), 129-148. https://10.1108/IJOPM-04-2016-0173

Farida, I., & Setiawan, D. (2022). Business strategies and competitive advantage: the role of performance and innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(3), 163.

Farida, I., & Setiawan, D. (2022). Business strategies and competitive advantage: the role of performance and innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(3), 163.

Feng, S., Berndt, A., & Ots, M. (2023). Residents and the place branding process: socio-spatial construction of a locked-down city's brand identity. *Journal of Place Management and Development*, *16*(3), 440-462.

Field, A. (2009). Discovering statistics using SPSS third edition.

ForouzeshNejad, A. A. (2023). Leagile and sustainable supplier selection problem in the Industry 4.0 era: a case study of the medical devices using hybrid multi-criteria decision making tool. *Environmental Science and Pollution Research*, *30*(5), 13418-13437.

Friesenbichler, K.; Reinstaller, A. Do firms facing competitors from emerging markets behave differently? Evidence from Austrian manufacturing firms. *Eur. Bus. Rev.*, *34*, 153-170.

Galankashi, M. R., Hisjam, M., & Helmi, S. A. (2016, March). Agile supplier selection: a fuzzy analytic hierarchy process (FAHP) approach. In *Proceedings of the sixth international conference on Industrial Engineering and Operations Management (IEOM)*.

Gloet, M., & Samson, D. (2016, January). Knowledge and innovation management: Developing dynamic capabilities to capture value from innovation. In *2016 49th Hawaii International Conference on System Sciences (HICSS)* (pp. 4282-4291). IEEE.

Gujarati, D., & Porter, D. (2009). *Essentials of econometrics 4e*. McGraw Hill.

Gustafsson, A., Snyder, H., & Witell, L. (2020). Service innovation: a new conceptualization and path forward. *Journal of Service Research*, *23*(2), 111-115.

Haakansson, H. & Ford, D. (2002) 'How should companies interact in business networks? *Journal of Business Research*, *55*, 133-139.

Haradhan M. (2017). Two Criteria for Good Measurements in Research: Validity and Reliability. Retrieved from https://mpra.ub.unimuenchen.de/83458/1/MPRA_paper_83458.pdf

Hashem, G., & Aboelmaged, M. (2023). Leagile manufacturing system adoption in an emerging economy: an examination of technological, organizational and environmental drivers. *Benchmarking: An International Journal*.

Holden, M. T., & Lynch, P. (2004). Choosing the appropriate methodology: Understanding research philosophy. *The marketing review*, *4*(4), 397-409.

Iqbal, T., Jajja, M. S. S., Bhutta, M. K., & Qureshi, S. N. (2020). Lean and agile manufacturing: complementary or competing capabilities? *Journal of Manufacturing Technology Management*, *31*(4), 749-774.

Jaya, S., & Kumar, A. (2016). Impact of supply chain management strategies on changing market conditions. *IOSR J. Bus. Manag*, *18*, 109-111.

Kenya Association of Manufacturers Members. (2018).

Kenya Economic Outlook. (2020).

Kenya National Bureau of Statistics (KNBS). (2020).

Kenya Property Developers Association (KPDA). 2019

Khan, S. N. (2014). Qualitative research method: Grounded theory. *International journal of business and management*, *9*(11), 224-233.

Kinuu, D. (2014). *Top management team psychological characteristics, institutional environment, team processes and performance of companies listed in Nairobi securities exchange* (Doctoral dissertation, University of Nairobi).

Koufteros, X. A., Vonderembse, M. A., & Doll, W. J. (2002). Integrated product development practices and competitive capabilities: the effects of uncertainty, equivocality, and platform strategy. *Journal of*

Operations Management, *20*(4), 331-355.

Krishnamurthy, R., & Yauch, C. A. (2007). Leagile manufacturing: a proposed corporate infrastructure. *International Journal of Operations & Production Management*.

Kurtmollaiev, S., Lervik-Olsen, L., & Andreassen, T. W. (2022). Competing through innovation: Let the customer judge! *Journal of Business Research*, *153*, 87-101.

Laforet, S. (2013). Organizational innovation outcomes in SMEs: Effects of age, size, and sector. *Journal of World business*, *48*(4), 490-502.

Laforet, S. (2013). Organizational innovation outcomes in SMEs: Effects of age, size, and sector. *Journal of World business*, *48*(4), 490-502.

Lee, C., Chihkang, Wu. & Din, J. (2022). Understanding the Impact of Competitive Advantage and Core Competency on Regional Tourism Revitalization: Empirical Evidence in Taiwan. *Frontiers in Psychology,* (13), 922211.

Levene, H., (1960). Robust tests for equality of variances. In I. Olkin, S. G. Ghurye, W. Hoeffding, W. G. Madow & H.B. Mann (Eds.), C*ontributions to probability and statistics*. Essays in Honor of Harold Hotelling. Stanford University Press,

Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., & Subba Rao, S. (2006). The Impact of Supply Chain Management Practice on Competitive Advantage and Organizational Performance. *Omega, 34*(1), 107-124.

Li, Y., Diabat, A., & Lu, C. C. (2020). Leagile supplier selection in Chinese textile industries: a DEMATEL approach. *Annals of Operations Research*, *287*(1), 303-322.

Li, Y., Ding, H., & Li, T. (2022). Path Research on the Value Chain Reconfiguration of Manufacturing Enterprises Under Digital Transformation–A Case Study of B Company. *Frontiers in Psychology*, *13*, 887391.

Maganha, I., Silva, C., & Ferreira, L. M. D. (2020). The impact of reconfigurability on the operational performance of manufacturing systems. *Journal of Manufacturing Technology Management*, *31*(1), 145-168.

Mahdi, O. R., Nassar, I. A., & Almsafir, M. K. (2019). Knowledge management processes and sustainable competitive advantage: An empirical examination in private universities. *Journal of business research*, *94*, 320-334.

Mandal, S. (2018). Enablers of warning and recovery capabilities in supply chains: an empirical study. *International Journal of Logistics Economics and Globalisation*, *7*(1), 28-48.

Mason-Jones, R., Naylor, B., & Towill, D. R. (2000). Lean, agile or leagile? Matching your supply chain to the marketplace. *International Journal of Production Research*, *38*(17), 4061-4070.

Mathiyazhagan, K., Agarwal, V., Appolloni, A., Saikouk, T., & Gnanavelbabu, A. (2021). Integrating lean and agile practices for achieving global sustainability goals in Indian manufacturing industries. *Technological Forecasting and Social Change*, *171*, 120982.

Mbusi, E. T. (2022). *Macro-Economic Factors for Enhancing Construction Output and Policy Formulation in Kenya* (Doctoral dissertation, JKUAT-COETEC).

McClave, J. T., Benson, P. G., & Sincich, T. (2018). Statistics for business and economics.

Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: Formal structure as myth and ceremony. *American journal of sociology*, *83*(2), 340-363.

Mohammaddust, F., Shabnam, R., Reza, Z. F., Mohammad, M., & Alex, H. (2017). Developing Lean and Responsive Supply Chains: A Robust Model for Alternative Risk Mitigation Strategies in Supply Chain Designs. *International Journal of Production Economics, 183*(Part C), 632-653. https://doi.org/10.1016/j.ijpe.2015.09.012

Mohammadian, R. (2014). The role of IT in innovation performance of children and Youth center. *Information Technology Management Quarterly, 2*(8), 10-89.

Monsur, S. M. T., & Yoshi, T. (2012). Improvement of firm performance by achieving competitive advantages through vertical integration in the apparel industry of Bangladesh. *Asian Economic and Financial Review*, *2*(6), 687.

Mugenda, O. M. and Mugenda, A. G. (2003). *Research Methods: Quantitative and Qualitative Approaches*. Acts Press: Nairobi.

Nafula, K. M., Namusonge, M., & Muathe, S. (2017). Effect of innovation on firm competitiveness: A Study of small and medium enterprises in the manufacturing sector in Nairobi City County, Kenya. *International Journal of Business Innovation and Research*, *18*, 43-59.

Nayak, R., & Choudhary, S. (2022). Operational excellence in humanitarian logistics and supply chain management through leagile framework: a case study from a non-mature economy. *Production Planning & Control*, *33*(6-7), 606-621.

Naylor, J. B., Naim, M. M., & Berry, D. (1999). Leagility: Integrating the lean and agile manufacturing paradigms in the total supply chain. *International Journal of Production Economics*, *62*(1-2), 107-118.

Naylor, J. B., Naim, M. M., & Berry, D. (1999). Leagility: Integrating the lean and agile manufacturing paradigms in the total supply chain. *International Journal of Production Economics*, *62*(1-2), 107-118.

Nyangilo, A. O. (2012). An assessment of the organization structure and leadership effects on construction projects performance in Kenya: a case study of public building projects within Nairobi region, Thesis. The University of Nairobi.

Nyeadi, J. D., Ibrahim, M., & Sare, Y. A. (2018). Corporate social responsibility and financial performance nexus: Empirical evidence from South African listed firms. *Journal of Global Responsibility*.

OECD., K. (2018). *OECD science, technology and innovation outlook 2018*. Paris: OECD publishing.

Oliver, C. (1990). Determinants of inter-organizational relationships: Integration and future directions. *Academy of management review*, *15*(2), 241-265.

Oyombe, G. G., Awino, Z. B., Ogutu, M., & Njihia, J. M. (2023). Realizing Competitive Advantage Through Leagile Strategy: A Survey of Construction Companies' Supply Chains in Nairobi-Kenya. *Journal of Business Strategy Finance and Management*, *5*(1), 40.

Oyombe, G. G., Awino, Z. B., Ogutu, M., & Njihia, J. M. (2023). Realizing Competitive Advantage Through Leagile Strategy: A Survey of Construction Companies' Supply Chains in Nairobi-Kenya. *Journal of Business Strategy Finance and Management*, *5*(1), 40.

Pasaribu, D., Sinurat, E. J., Tambunan, D., & Nainggolan, A. (2023). Model Analysis of Strengthening the Success and Sustainability of MSMEs in Pematang Siantar. *Journal of Hunan University Natural Sciences*, *50*(7).

Patel, P. C., Kohtamäki, M., Parida, V., & Wincent, J. (2015). Entrepreneurial orientation-as-experimentation and firm performance: the enabling role of absorptive capacity. *Strategic Management Journal, 36*(11), 1739-1749.

Porter, M. E. (1999). Michael Porter on competition. *The Antitrust Bulletin*, *44*(4), 841-880.

Porter, M.E., (2000). Location, competition, and economic development: local clusters in a global economy. *Economic Development Quarterly* 14(1), 15–34.

Qrunfleh, S., & Tarafdar, M. (2014). Supply chain information systems strategy: Impacts on supply chain performance and firm performance. *International journal of production economics*, *147*, 340-350.

Rahimnia, F., Moghadasian, M., & Castka, P. (2009). Benchmarking leagility in mass services: The case of a fast food restaurant chains in Iran. *Benchmarking: An International Journal*, *16*(6), 799-816.

Raji, I. O., Shevtshenko, E., Rossi, T., & Strozzi, F. (2021, October). Modelling the relationship of digital technologies with lean and agile strategies. In *Supply Chain Forum: An International Journal, 22*(4), 323-346.

Rezai Dowlatabadi, H., & Saneian, Z. S. (2013). Analysis effective pattern of marketing innovation on sustainable competitive advantage by entrepreneurship. *Entrepreneurship Development, 6*(4), 113-129.

Ritella, G., & Sansone, N. (2020). COVID-19: Turning a huge challenge into an opportunity. *Qwerty-Open and Interdisciplinary Journal of Technology, Culture and Education*, *15*(1), 5-11.

Ruiqi, W., Wang, F., Xu, L., & Yuan, C. (2017). R&D expenditures, ultimate ownership and future performance: Evidence from China. *Journal of Business Research*, *71*, 47-54.

Ruiqi, W., Wang, F., Xu, L., & Yuan, C. (2017). R&D expenditures, ultimate ownership and future performance:

Evidence from China. *Journal of Business Research*, *71*, 47-54.

Salkind, N. J. (Ed.). (2010). *Encyclopedia of research design* (Vol. 1). Sage.

Schumpeter, J.A. (1934). *The Theory of Economic Development.* Cambridge, Mass.: Harvard University Press (originally published in German in 1911; reprinted by Transaction Publishers, New Brunswick, New Jersey in 1997).

Shah, A., Rose, C., Ibrahim, A., Khan, S. A. R., & Tanveer, M. (2023). A resource and leagile strategy in business operations for performance improvement. *Decision Analytics Journal*, *7*, 100197.

Shakhour, N. H. T., Obeidat, B. Y., Jaradat, M. O., & Alshurideh, M. (2021). Agile-minded organizational excellence: Empirical investigation. *Academy of Strategic Management Journal*, *20*, 1-25.

Slater, S. F., Hult, G. T. M., & Olson, E. M. (2010). Factors influencing the relative importance of marketing strategy creativity and marketing strategy implementation effectiveness. *Industrial marketing management*, *39*(4), 551-559.

Srinivasan, M., Srivastava, P., & Iyer, K. N. (2020). Response strategy to environment context factors using a lean and agile approach: Implications for firm performance. *European Management Journal*, *38*(6), 900-913.

Sun, J., Maksimov, V., Wang, S. L., & Luo, Y. (2021). Developing compositional capability in emerging-market SMEs. *Journal of World Business*, *56*(3), 101148.

Sundar, R., Balaji, A. N., & Satheesh Kumar, R. M. (2014). A review on lean manufacturing implementation techniques. *Procedia Engineering, 97*, 1875-1885. https://doi.org/10.1016/j.proeng.2014.12.341

Ta'Amnha, M. A., Magableh, I. K., Asad, M., & Al-Qudah, S. (2023). Open innovation: The missing link between synergetic effect of entrepreneurial orientation and knowledge management over product innovation performance. *Journal of Open Innovation: Technology, Market, and Complexity*, *9*(4), 100147.

Tabachnick, B. G., & Fidel, L. S. (2007). Basic ANOVA: Logic of analysis and tests of assumptions. In B. G. Tabachnick & L. S. Fidel (Eds.), *Experimental design using ANOVA* (pp. 69-97). Belmont, CA: Thompson Brooks/Cole.

Tanvir, M.S. & Yoshi, T. (2012). Impact of Leagile manufacturing system on industrial up-gradation of apparel industry of Bangladesh. *International Journal of Asian Social Science*, *2*(10), 1698-1717.

Teece, D. J. (2012). Dynamic capabilities: Routines versus entrepreneurial action. *Journal of Management Studies*, *49*(8), 1395-1401.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*, *18*(7), 509-533.

Tharwa, N. (2022) Lean-Agile supply chain innovation performance; the mediating role of dynamic capability, innovation capacity, and relational embeddedness. *Supply Chain Forum: An International Journal*, *23*(3), 285-306. https://doi.org/10.1080/16258312.2022.2031276

Tidd, J., & Hull, F. M. (2006). Managing service innovation: the need for selectivity rather than 'best practice'. *New Technology, Work and Employment*, *21*(2), 139-161.

Tolbert, P. S., David, R. J., & Sine, W. D. (2011). Studying choice and change: The intersection of institutional theory and entrepreneurship research. *Organization Science*, *22*(5), 1332-1344.

Udriyah, U., Jacquline, T., & Azam, S. (2019). The effects of market orientation and innovation on competitive advantage and business performance of textile SMEs. *Management Science Letters,* 9(9), 1419-1428.

Zhang, M. J., & Lado, A. A. (2001). Information systems and competitive advantage: a competency-based view. *Technovation*, *21*(3), 147-156.

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