

## A systematic review and conceptual framework of supply chain agility as a strategic enabler of firm competitiveness

Conrad Ocheo Mogaka \*, Annpiera Njururi \*\*

\* School of Business and Economics, Mount Kenya University,  
General Kago Rd, Thika, Kenya  
[mogakaconrad@gmail.com](mailto:mogakaconrad@gmail.com);

\*\* School of Business and Management, Kiriri Women's University of Science and Technology,  
Kasarani, Nairobi, Kenya  
[anjiruri@kwust.ac.ke](mailto:anjiruri@kwust.ac.ke)



### Article history:

Received: September 01,  
2024

1st Revision: September 15,  
2024

Accepted: November 14,  
2024

### DOI:

[10.14254/jsdtl.2024.9-2.8](https://doi.org/10.14254/jsdtl.2024.9-2.8)

**Abstract:** *Purpose:* This study aims to explore supply chain agility as a strategic facilitator of firm competitiveness by critically analyzing existing literature and proposing a research agenda based on a conceptual framework. *Methodology:* A systematic literature review and co-citation analysis were conducted, examining 22 research papers from 1999 to 2024 sourced from reputable academic journals. *Results:* The study identifies key dimensions of supply chain agility, including responsiveness, flexibility, visibility, competency, resilience, and adaptability. It categorizes existing literature into modeling enablers, adoption, implementation, and agility measurement for enhancing competitiveness. A contemporary structure and framework for supply chain agility is presented. *Theoretical contribution:* The paper provides a comprehensive review of fundamental concepts related to supply chain agility and competitiveness, offering a conceptual framework that enhances the understanding of agile capabilities in both public and private sectors. *Practical implications:* The findings offer insights for supply chain managers on maintaining competitiveness in volatile markets, providing knowledge on adopting, implementing, and measuring agility throughout the supply chain.

**Keywords:** competitiveness, supply chain agility, supply chain flexibility, leagility, supply chain adaptability, supply chain resilience, supply chain visibility, supply chain competency

**Sustainable Development Goals (SDGs):** **SDG 8:** Decent Work and Economic Growth; **SDG 9:** Industry, Innovation and Infrastructure; **SDG 12:** Responsible Consumption and Production

## 1. Introduction

Supply chains worldwide are confronted with difficulties that have never been seen before due to natural disasters like earthquakes and hurricanes, artificial disasters like terrorism and conflict, and pandemics like COVID-19 (Patel & Sambasivan, 2022). When confronted with these difficulties, industries are more likely to experience significant interruptions in their supply chains. Companies' ability to adapt quickly to new problems and satisfy the requirements of their clientele is a significant factor in determining whether or not they will continue to exist and achieve success. When establishing competitiveness in today's tumultuous and volatile business climate, supply chain agility is crucial (Patel & Sambasivan, 2022). For this reason, it is essential to incorporate agility into the supply chain to ensure organizations' continued existence and expansion. Additionally, in recent times, rivalry based on supply chains has garnered substantial attention, particularly regarding the fact that business settings are characterized by a higher degree of uncertainty.

Much attention has been paid to supply chain agility, as Gligor *et al.* (2013) have pointed out. This attention or concentration shows how relevant it is to improving performance. In order to achieve its goal of enabling faster responses or adaptability to changes in the market, supply chain agility is based on the sharing of information, the visibility of the supply chain, and collaboration (Brusset, 2016). As Gligor *et al.* (2016) point out, supply chain agility presents vital comments on dealing with issues of uncertainty and risk, and as a result, it deserves critical attention and emphasis in this era of different uncertainties. The author believes that this is the case. Furthermore, uncertain market conditions have become a characteristic of the modern business environment, and the unpredictability of the market has led to a decline in the commercial operations of organizations (Aldhaheeri & Ahmad, 2023). Businesses are currently confronted with ongoing challenges due to the combination of globalization, technological advancement, and the ever-changing preferences of consumers (Sato, Tse & Tan, 2020).

According to Manurung and Kurniawan (2022), for organizations to withstand severe competition, they must develop and execute effective strategies that allow them to respond to change in a timely and effective manner. Firms emphasize the necessity of controlling and distributing their resources by developing supply chains that are both competitive and sustainable (Nagariya, Kumar & Kumar, 2022). This is because to meet their customers' expectations, they are expected to provide them with high-quality products and services. However, due to the high degree of unpredictability in the global business world, they cannot provide the high value anticipated to be provided to stakeholders (Aslam, Khan, Rashid & Rehman, 2020). According to Oliveira-Dias, Moyano-Fuentes, and Maqueira-Marín (2022), supply chain operations' agility is vital to transforming essential business processes. This is because it helps organizations become more sensitive to change. According to Tessarini and Saltorato (2021), organizations that emphasize agility have the potential to achieve more excellent performance stability.

The idea of agility has been successfully coupled with the notion of flexibility to provide the ideal working environment (Fernandez-Giordano, Stevenson, Gutierrez, & Llorens-Montes, 2022). According to Tam *et al.* (2020), adopting agile operations for businesses is connected with enhanced organizational performance, leading to increased customer satisfaction and confidence. Many studies on the relationship between SC agility and organizations' competitive potential can be found in the existing body of literature. An example of this would be the research conducted by Pu, Li, and Bai (2023), which investigated the impact of SC resilience on a company's ability to maintain a sustainable competitive advantage in the Chinese setting. However, the authors acknowledged that the study had a drawback because the findings might not apply to other cultural settings or industries.

Recent research conducted by Al Humdan, Shi, Behnia and Najmaei (2020) has revealed that the notion of SCA is gaining more and more acceptance, even though it continues to be plagued by definitional uncertainty. It is believed that this study would promote the conversation on the different ways of using the stakeholder model. This is because the existing body of literature shows contradictory conclusions regarding the role of stakeholders in supporting the association between supply chain agility and an organization's competitive potential. As was demonstrated in earlier studies, this investigation was carried out to ensure that SC agility is maintained. According to Susitha, Jayarathna and Herath (2024), one of the most essential variables in gaining competitive advantages and being ahead of competitors is whether or not an organization can compete.

The purpose of this study is to research the connection between supply chain agility and competitiveness to gain more pertinent insights into the performance of organizations in the setting of agile supply chains (Chen, 2018). According to Ciccullo, Pero, Caridi, Gosling, and Purvis (2018), organizations that are better equipped with competitive competencies could provide much more value to their stakeholders. In the context of the specific arguments on supply chain agility and organizations' competitive strengths, the study substantially contributes to the existing body of literature by conducting an in-depth investigation of agile supply chains in both the public and commercial sectors. The value of supply chain agility, both theoretical and practical, is examined in order to gain a better understanding of the characteristics that distinguish agile, flexible, and responsive supply chains. In addition, the theoretical framework contributes to the existing body of literature by enhancing students' understanding of agile capabilities. Considering that supply chain agility applies to both the public and commercial sectors, the empirical investigation of this concept can offer significant insights into the functioning of organizations. Therefore, researchers, practitioners in various disciplines, and academicians can expand their knowledge and understanding of SC agility's theoretical and practical consequences.

## **2. Supply chain agility**

The requirement for customer response has been intensified as a result of today's globally pronounced happenings, which include market instability and volatility, lessening the lifespan of products, higher demand uncertainty, and competitive pressures (Tukamuhabwa, Mutebi & Kwagala, 2023). It has become increasingly important for organizations to have a supply chain that is agile in order to flourish in the current market environment, which is both dynamic and unpredictable. The ability of a supply chain to quickly adjust and react to shifts in demand, supply, or environmental factors is what is meant by capacity for rapid adaptation (Srimarut & Mekhum, 2020). For organizations to maintain their competitive edge, fulfill the demands of their customers, and reduce risks, agility is essential. A significant amount of research has been conducted in the academic literature to investigate the topic of supply chain agility. The initial research focused on the significance of adaptability and responsiveness in supply chains (Tajima, 2005).

The concept of agility, on the other hand, has developed to embrace a wider variety of competencies, such as the capacity to detect and anticipate changes, make rapid adjustments in response to disruptions, and successfully interact with partners across the supply chain (Hazen, Bradley, Bell, In & Byrd, 2017). Several different aspects of supply chain agility were found in the research that was conducted. According to Yusuf, Gunasekaran, Adeleye, and Sivayoganathan (2004), these dimensions consist of rapidity, responsiveness, degree of flexibility, and level of competency. Quickness is the speed at which an entire supply chain can respond to changes, whereas responsiveness is the ability to customize offers to match unique consumer needs. Quickness and responsiveness are two different aspects of the same concept. The capacity to alter operations to meet variations in demand or supply is an example of flexibility. Conversely, competency refers to the skills and knowledge required to implement agile initiatives effectively.

It has been determined that several different criteria enable supply chain agility (Kumar & Bhat, 2014). Information technology, lean approaches, strategic alliances, and organizational culture are some variables contributing to this phenomenon (Boubaker, Jemai, Sahin & Dallery, 2019). Information technology is critical in facilitating these processes by providing real-time visibility and communication throughout the supply chain (Cadden, McIvor, Cao, Treacy, Yang, Gupta, & Onofrei, 2022). Through eliminating waste and enhancing productivity, lean methods, such as just-in-time inventory and continuous improvement, translate to the development of agility (Abdelilah, El Korchi & Amine Balambo, 2023). Building trust, fostering collaboration, and sharing information are all critical components of agile operations, and strategic partnerships with customers and suppliers develop these qualities (Obinna, 2024).

Finally, agile strategies are more likely to succeed in an organization with a culture emphasizing innovation, taking risks, ongoing training, and awareness (Fayezi, Zutshi & O'Loughlin, 2017). Many advantages can be gained by having an agile supply chain (Abdoli Bidhandi & Valmohammadi, 2017). Flexible supply chains have the potential to enhance customer satisfaction by ensuring that products and services are delivered on time and to the specifications (Fayezi, Zutshi & O'Loughlin, 2017).

Additionally, they can cut expenses by reducing the amount of inventory they have, increasing the efficiency of their operations, and eliminating disruptions (Shukor, Newaz, Rahman & Taha, 2021). Further, agile supply chains have the potential to improve a company's image for dependability and responsiveness, which can result in greater customer loyalty, share of the market, and competitiveness (Wu, Tseng, Chiu & Lim, 2017).

## **2.1. Supply chain responsiveness**

The capacity of a supply chain to respond rapidly and effectively to shifts in consumer demand or disruptions in the supply chain is referred to as its responsiveness (Ayoub & Abdallah, 2019). This ability requires the supply chain to execute orders promptly and accurately while also adjusting to an unexpected set of circumstances (Kazancoglu, Ozbiltekin-Pala, Mangla, Kazancoglu & Jabeen, 2022). Several measures are frequently used to quantify it, including ordering and fulfillment time, waiting time, and customer satisfaction. A supply chain's responsiveness can be measured in several dimensions: speed, adaptability, reliability, and customization (Naqvi, Asim & Manzoor, 2020). Information technology, collaborative partnerships, lean processes, and agile manufacturing enable supply chain responsiveness (Dubey, Altay, Gunasekaran, Blome, Papadopoulos & Childe, 2018). At the other end of the spectrum is the concept of supply chain agility, which describes the capacity of a supply chain to swiftly and efficiently adjust to changes in the market environment. The ability to detect and react to shifts in customer demand, actions taken by competitors, and disturbances in supply chain operations are all required for this strategy (Aslam, Blome Roscoe & Azhar, 2018). Several indicators are frequently used to evaluate agility, including time to market, product innovation, and market share. Supply chain agility encompasses several different dimensions, including adaptation, creativity, learning, and resilience (Aslam, Khan, Rashid & Rehman, 2020).

The utilization of information technology, collaborative connections, flexible manufacturing methods, and virtual organizations are all factors that contribute to the agility of supply chain operations (Dehgani & Jafari Navimipour, 2019). Therefore, there is a considerable relationship between supply chain performance and both the supply chain's responsiveness and the supply chain's agility. Agileness can lead to increased market share, faster time to market, and improved product innovation, while responsiveness can lead to improved customer satisfaction, decreased lead times, and cheaper inventory costs (Eckstein, Goellner, Blome & Henke, 2015). Both of these outcomes are possible when responsiveness is implemented. It is essential to note that responsiveness and agility are not incompatible and frequently pair well (Gligor, Esmark & Holcomb, 2015). The ability to swiftly adapt to changes in the market environment is one way in which a responsive supply chain may be more agile. Another way in which an agile supply chain can be more responsive is by having the ability to quickly react to changes in customer demand or interruptions in the supply chain (Shekarian, Nooraie & Parast, 2020). Organizations can establish strategies to improve their supply chain performance and obtain a competitive edge if they thoroughly understand the definitions, dimensions, enablers, and performance implications of the ideas being discussed.

## **2.2. Supply chain flexibility**

Two interconnected aspects, namely flexibility and agility, are typically responsible for determining the performance of supply chains. According to Shekarian, Nooraie, and Parast's research from 2020, flexibility refers to the precise degree to which a corporation can quickly adjust to shifting market conditions. Agility is related to creating externally intensive competencies, whereas flexibility is primarily focused on developing internally intensive competencies within businesses. According to Gupta, Drave, Bag, and Luo (2019), organizations emphasizing flexibility aim to enhance their purchasing production and supply processes. The emphasis placed on agility, on the other hand, suggests actions that can lead to rapid and effective market reaction, quickness, and a reduction in the amount of time required to execute a variety of responsibilities that are vital (Abdelilah, El Korchi & Balambo, 2018). In order to understand the connection between supply chain flexibility and supply chain agility, it is essential to acknowledge the crucial role that cooperation from many stakeholders plays (Um, 2017). They devote their efforts to demonstrating and putting their expert knowledge into practice in order to be able to solve a variety of complex challenges that arise throughout the supply

chain activities (Macclever, Annan & Boahen, 2017). Organizations can improve their knowledge of how to boost their capacity for responsiveness over time by comprehensively examining SC agility.

### **2.3. Supply chain visibility**

When it comes to improving the operational efficiency of an organization, visibility is an essential component since it enables businesses to make well-informed strategic decisions and plans for subsequent activities. Research conducted by Poleacovschi and Javernick-Will in 2020 found that organizations that incorporate visibility in their operations tend to adopt a proactive mindset, increasing their capacity for decision-making. According to Apeji and Sunmola (2022), it is essential to maintain transparency in the supply chain's activities with key partners and employees. Organizations can generate superior intellectual capital and enrich their institutional knowledge, which may be achieved through increased visibility (Farzaneh, Wilden, Afshari & Mehralian, 2022). The concept of supply chain agility is linked to the concept of visibility in the supply chain. This is because visibility is derived from the concept of organizational discipline. According to Apeji and Sunmola (2023), the emphasis placed on establishing visibility capabilities means that organizations are consistently pushed to arrange their operations to assist them in accomplishing their common goals. Therefore, developing a high confidence level between various partners in the supply chain is feasible. This is because many stakeholders have high expectations of organizations regarding the visibility and openness of their activities and practices (Aldhaheeri & Ahmad, 2023). Furthermore, there is a strong correlation between enhanced information-sharing protocols at all levels of an organization and increased supply chain visibility (Adhi Santharm and Ramanathan, 2022). On the other hand, businesses are better equipped strategically to deal with a variety of issues that they will face in the global economy.

### **2.4. Supply chain competency**

In today's fast-paced and ever-changing business environment, supply chain agility, which refers to the capacity to react quickly and efficiently to changing market conditions and disruptions, has emerged as an essential quality for firms to possess in order to thrive (Jermisittiparsert & Wajeetongratana, 2019). The sturdy foundation of supply chain competencies is the cornerstone upon which this agility is built (Ngai, Chau & Chan, 2011). Supply chain competencies cover the combined knowledge, skills, and capabilities of individuals and teams within a supply chain to successfully manage and optimize its operations (Huma & Ahmed, 2022). The ability to recognize and react to shifts in market demand and consumer preferences, anticipate and adapt to possible difficulties and opportunities, and continuously learn and grow are the characteristics that define a competent supply chain (Abdoli Bidhandi & Valmohammadi, 2017). The ability to be agile and competent in the supply chain are strongly correlated. In order to improve decision-making, promote information sharing and collaboration, stimulate innovation, and develop resilience, an effective supply chain equipped with the appropriate skills and knowledge is in a better position to do so (Zhang, Gu & Huo, 2023). Supply chain experts who are competent can make judgments based on accurate information, such as choosing the appropriate vendors, optimizing the amount of inventory, and putting into action logistics methods that are highly effective (Aziati, Ling, Ahmad & Abdullah, 2018). A supply chain must have competent partners to promote effective communication and collaboration among partners in the supply chain (Samdantsoodol, Cang, Yu, Eardley & Buyantsogt, 2017). This is necessary in order to respond quickly to changes.

Furthermore, skilled supply chain teams can recognize chances for innovation, such as the creation of new products or services, the use of innovative technologies, or the exploration of new markets (Rasool, Murtza, Rasheed, Leong, Okumus & Bai, 2024). A competent supply chain may establish resilience through contingency plans, supplier diversification, and solid risk management procedures (Abdoli Bidhandi & Valmohammadi, 2017). The connection between supply chain agility and supply chain competency has been the subject of empirical investigation in significant research. According to the findings of a body of research, businesses that possess better levels of supply chain competency, such as strong leadership, effective communication, and information technology capabilities, tend to demonstrate greater agility (Aunyawong, Waiyawuththanapoom, Pintuma & Sitthipo, 2020). These firms have a greater capacity to respond to variations in the market, adapt to

shifting client requirements, and reduce risks more efficiently. Companies can increase their capacity to respond to changes in the market, innovate, and build resilience by cultivating and developing a skilled staff (Aziati, Ling, Ahmad & Abdullah, 2018). Organizations that prioritize supply chain competencies will be in a better position to prosper in the age of agility as the business environment continues to undergo continuous change.

## 2.5. Supply chain resilience

According to Gligor, Gligor, Holcomb, and Bozkurt (2019), supply chain resilience and agility constitute two solutions essential for achieving effective supply chain management in present-day corporate environments characterized by high levels of uncertainty and volatility. Although they are frequently discussed together and regarded as complementary, they are diverse in their qualities and serve to accomplish various goals. According to Ali, Mahfouz, and Arisha (2017), supply chain resilience refers to the capacity of a supply chain not only to absorb disruptions but also to adapt to and recover from them. The stability and robustness of the entire supply chain in the face of unforeseen occurrences, which might include catastrophic events, pandemics, or geopolitical disputes, is the primary emphasis of this initiative (Tarigan, Siagian & Jie, 2021). When discussing the ability to maintain operations and satisfy customer expectations despite adversity, we mean resilience in the supply chain. The ability of a supply chain to quickly react to shifts in demand or supply is referred to as supply chain agility (Zhu & Gao, 2021). This ability is a critical component of supply chain management. It emphasizes adaptability, reactivity, and the capacity to adjust to conditions in the market that frequently change (Zhou, Xu, Chiao & Fang, 2024). The ability to rapidly and effectively pivot is one of the most critical aspects of agility, as it enables a supply chain to capitalize on new possibilities and avoid disruptions. Although resilience and agility are two separate concepts, they are also intertwined. When handling disruptions, a resilient supply chain is more equipped, which can boost its ability to respond to changes (Zhu, Peko, Sundaram & Piramuthu, 2022).

Similarly, a nimble supply chain can react quickly to disturbances, increasing the likelihood of recovering more quickly (Ni, Chen & Nianchun, 2021). The link between supply chain agility and resilience has been investigated in several studies. According to the findings of Gligor *et al.* (2019), for instance, agility and resilience are necessary for effective resource utilization and long-term competitiveness. The ability to alter tactics and operations, speed up activities, scan the environment, and anticipate changes are some features they recognized as holding commonalities between the two concepts. Using COVID-19 as a backdrop, Zhuo *et al.* (2021) researched the association between supply chain agility and infrastructure resilience. The researchers discovered that supply chains that were more agile were better able to retain their performance and respond to the interruptions caused by the pandemic (Ivanov, 2022). As a result, agility can contribute to resilience by enabling a supply chain to adjust successfully to unforeseen outcomes (Kazancoglu, Ozbiltekin-Pala, Mangla, Kazancoglu & Jabeen, 2022). However, it is essential to remember that resiliency and agility do not necessarily exhibit a mutually reinforcing relationship. In certain circumstances, giving priority to one over the other may result in results that were not intended (Aslam, Khan, Rashid & Rehman, 2020). An example of this would be placing excessive emphasis on agility, which could potentially impair resilience by rendering the supply chain more susceptible to disturbances. In a similar vein, giving priority to resilience may impair agility by reducing the supply chain's ability to adapt to changes.

## 2.6. Supply chain adaptability

Several facets and complexities are involved in the relationship between adaptability and agility in supply chain management (Aslam, Blome, Roscoe & Azhar, 2018). Even though they are separate ideas, they are frequently interwoven and mutually supportive of one another. Because it is built on the foundation of being able to react rapidly to only temporary changes, a highly adaptable supply chain can be more agile (Dubey, Altay, Gunasekaran, Blome, Papadopoulos & Childe, 2018). On the other hand, an agile supply chain can be more adaptive because it can swiftly experiment with new methods and gain knowledge from its experiences (Feizabadi, Gligor & Alibakhshi, 2021). The relationship between supply chain flexibility and agility has been the subject of several studies, which have highlighted the impact of these two factors on the performance of organizations (Tarigan, Siagian & Jie, 2021). As an illustration,

for instance, research conducted by Chen (2018) reveals that supply chain agility is a crucial driver of competitive advantage. This enables businesses to differentiate themselves from competitors by providing higher customer service and responsiveness. Similarly, research conducted by Eckstein, Goellner, Blome and Henke (2015) highlights the significance of supply chain adaptability in managing risks and uncertainties, which ultimately results in greater resilience and financial performance overall. The relationship between adaptability and agility is complicated and involves many different aspects (Feizabadi, Gligor & Alibakhshi, 2021). For the supply chain to absorb shocks and respond to new situations, adaptability is the foundation upon which agility is built. It is difficult to acquire agility without adaptability since the supply chain may not have the resilience to respond effectively to shocks (Tajima, 2005).

Additionally, agility is difficult to achieve. On the other hand, agility is a subset of adaptability that is increased by adding speed and responsiveness to the equation. The ability to quickly recognize and capitalize on emerging possibilities while simultaneously limiting the effect of bad occurrences is a vital characteristic of a supply chain that is highly agile (Dubey & Gunasekaran, 2016). The relationship between adaptability and agility has been the subject of several studies, which have shown the synergistic impact that these two characteristics have on supply chain performance. For example, Christopher and Towill (2001) developed the idea of "leagility," a combination of lean principles and agile techniques to accomplish both responsiveness and efficiency. The concept of agility emphasizes the significance of adaptability in developing a flexible supply chain that can quickly adjust to shifting market conditions.

### 3. Firm competitiveness

The competition among supply chains (SCs) has evolved from competition between individual entities to competition among SCs as integrated SCs comprising of different business partnerships (Abdallah *et al.*, 2021). This is happening as supply chains (SCs) are working to improve their performance levels and maintain their competitive positions. In the context of SCs, agility is regarded as a significant competency and a vital driver for improving and maintaining SCs (Abdallah *et al.*, 2021). As a means of enhancing one's capacity to respond to situations that are unpredictable and unanticipated (Chen, 2019), agility has garnered a significant amount of attention in both the academic literature and the practical world for the past twenty years (Al Humdan *et al.*, 2020). As was said earlier, the concept of SC agility refers to an organization's readiness to deal with the uncertainties associated with expanding markets in a prompt and effective manner. According to Tarofder *et al.* (2019), improved SC agility is connected with many benefits for businesses, including but not limited to increased market share, high levels of customer satisfaction and trust, and increased market share. These factors suggest that businesses have the potential to increase their ability to compete with time. Since businesses are aware of the significance of SC agility, they begin to organize their actions to maximize the chances for market capitalization (Alzoubi & Yanamandra, 2020). According to Kaviyani-Charati *et al.* (2022), the existence of agile organizational operations fosters a high level of flexibility and consistency in the processes that are involved in supply chain management.

In addition, the relationship between agility and competitive capability was investigated in a study that was carried out by Seo and colleagues (2021). Industry professionals investigated various agility enablers, concluding that flexibility and lead time reduction were the most critical factors in maintaining SC agility (Seo *et al.*, 2021). In order to determine the emergence of these elements, it was necessary to build a greater understanding of the market by concentrating on specific topics such as market sensitivity, ongoing market changes, and the sharing of market information. While this was going on, Seo *et al.* (2021) made the observation that the combination of internal and external integration achieved the optimal level of SC agility. It is possible to strengthen the concept of SC agility further to assist businesses in improving their competitive capability. This may be accomplished by integrating processes, increasing trust among key stakeholders, and maintaining open communication lines. Because of this, organizations have the potential to enhance their competitive capability as they acquire the skills necessary to manage their resources better. The company can capitalize on regions that would otherwise have the potential to have negative consequences; in return, these areas can give the company a competitive edge. This is accomplished by building a predisposition to respond appropriately to

market challenges. According to Chen (2019), agile operations are trustworthy when coping with the continual change that involves customers' wants and the market shift.

#### 4. Research methodology

For the purpose of gaining an understanding of the elements that influence the SC agility and competitiveness of organizations, the current study employs quantitative research technique as its primary objective. In an effort to establish a proposed conceptual framework for future research agendas that are focused on competitiveness as a result of supply chain agility, this study implements a systematic literature review and co-citation analysis to conduct a comprehensive analysis of a diverse array of articles on supply chain agility from 1999 to 2024. During this research, a comprehensive evaluation, analysis, and synthesis of twenty-three research papers pertinent to various aspects of supply chain agility are developed. These papers were compiled from scholarly periodicals that are widely recognized.

#### 5. Literature analysis and findings

The study that is presented in this paper describes the gaps that are present within the existing literature on supply chain agility as well as the literature written about competitiveness. The findings of the study paper make a clear recommendation for investigating the relationship between supply chain agility and the projected and actual competitiveness of businesses (Table 1).

Significant findings from this research include the defining qualities of supply chain agility in respect to contributing aspects such as responsiveness, flexibility, visibility, competency resilience, and adaptability. These findings are the result of an investigation that was carried out. Among the many different aspects of agility that have been researched in the existing body of literature, the most common ones are as follows: flexibility, innovation, leadership, resilience, collaboration, speed, adaptation, swiftness, alertness, responsiveness, and visibility. Several areas may be used to classify the literature that pertains to supply chain agility. These categories include the modeling of enablers, the adoption of agility, the implementation of agility, and measurement to increase competitiveness. Within the scope of this study, a contemporary structure and framework for supply chain agility is presented. Future research will likely concentrate on the obstacles that stand in the way of the adoption and implementation of agility, the development of efficient methods for measuring agility, and the requirement for empirical studies that can verify the proposed framework on supply chain agility within the contexts of healthcare, building and construction, agriculture, and humanitarian supply chains.

**Table 1: Supply chain agility dimensions in literature reviewed**

Authors	Year	Featured supply chain agility dimensions
Osoro, Noor & Nyanga'u	2024	Flexibility, Responsiveness, Swiftness
Kuria & Ndeto	2024	Supply chain alertness, Supply chain flexibility
Wanyama & Osoro	2024	Market sensitivity, Virtual integration
Aldhaheeri & Ahmad	2023	Flexibility, Innovation, Leadership, Speed, Visibility
Tukamuhabwa, Mutebi & Kwagala	2023	Accessibility, Alertness, Decisiveness, Flexibility, Swiftness
Machuk, Kwendo & Fozia	2023	Supply chain information systems, Supply chain resilience, Supply chain responsiveness
Lengala	2022	Adaptability, Degree of collaboration, Product quality & customization, Time to delivery
Karani	2022	Delivery flexibility, Manufacturing capacity, Responsiveness
Kiswili, Shale & Osoro	2021	Supply chain reactivity, Supply chain velocity, Supply chain visibility
Patel, Tiwari, Kumar, Samuel & Sutar	2020	Competency, Cost-effectiveness, Quickness, Responsiveness, Robustness
Sharma, Sahay, Shankar & Sarma	2017	Flexibility, Responsiveness, Risk hedging
Gligor, Holcomb & Stank	2013	Accessibility, Alertness, Decisiveness, Flexibility, Swiftness
Damghani & Tavana	2013	Competency, Flexibility, Quickness, Responsiveness

Nejatian & Zarei	2013	Competency, Flexibility, Quickness, Responsiveness
Carvalho, Azevedo & Cruz-Machado	2012	Collaboration, Competence, Flexibility, Responsiveness, Velocity, Visibility
Zhang	2011	Competency, Customer focus, Flexibility, Partnership, Proactiveness, Quickness, Responsiveness
Tseng and Lin	2011	Competency, Flexibility, Quickness, Responsiveness
Yaghoubi and Kord	2011	Competency, Quickness, Responsiveness
Jain, Benyoucef & Deshmukh	2008	Competency, Flexibility, Quickness, Responsiveness
Zhang and Sharifi	2007	Competency, Customer Focus, Flexibility, Partnership, Proactiveness, Quickness, Responsiveness
Lin, Chiu & Chu	2006	Competency, Flexibility, Quickness, Responsiveness
Yusuf, Gunasekaran, Adeleye & Sivayoganathan	2004	Rapidity, Responsiveness, Degree of Flexibility, Level of Competency
Sharifi and Zhang	1999	Competency, Flexibility, Quickness, Responsiveness

## 6. Suggested research agenda

Many studies on the relationship between supply chain agility and organizations' competitiveness can be found in the existing body of literature. An example of this would be the research conducted by Pu *et al.* (2022), which investigated the impact of supply chain agility on a company's ability to maintain a sustainable competitive advantage in the Chinese setting. However, the authors acknowledged that the study had a drawback in that the findings might not apply to other cultural contexts or industries. It is believed that this study would promote the conversation on the different ways of using the stakeholder model. This is because the existing body of literature shows contradictory conclusions regarding the role of stakeholders in supporting the link between SC agility and an organization's competitive potential. As was demonstrated in earlier studies, this investigation was carried out to ensure that SC agility is maintained. According to Um (2017), one of the most essential variables in gaining competitive advantages and being ahead of competitors is whether or not an organization can compete.

This study aims to research the link between supply chain agility and competitiveness to gain more pertinent insights into the performance of organizations in the setting of agile supply chains (Um, 2017). According to the findings of Ciccullo *et al.* (2018), organizations that are better equipped with competitive capabilities could provide much more value to their stakeholders. The study makes a substantial contribution to the existing body of literature by conducting an in-depth investigation into agile supply chains in both the public and commercial sectors. This is done in the context of specific arguments concerning supply chain agility and the competitiveness of organizations. The implications of supply chain agility, both theoretical and practical, are examined in order to gain a better understanding of the characteristics that distinguish agile, flexible, and responsive supply chains.

In addition, the conceptual framework contributes to the existing body of literature by enhancing students' understanding of agile capabilities. Considering that the idea of SC agility is applicable to both the public and commercial sectors, the empirical investigation of this concept can offer significant insights into the functioning of organizations. Therefore, researchers, practitioners in various disciplines, and academicians can expand their knowledge of the theoretical and practical effects of SC agility. Considered in light of the empirical considerations that were presented earlier, the following hypotheses have been proposed:

*H<sub>1</sub>: Supply chain responsiveness has a statistically significant effect on supply chain agility*

*H<sub>2</sub>: Supply chain flexibility has a statistically significant effect on supply chain agility*

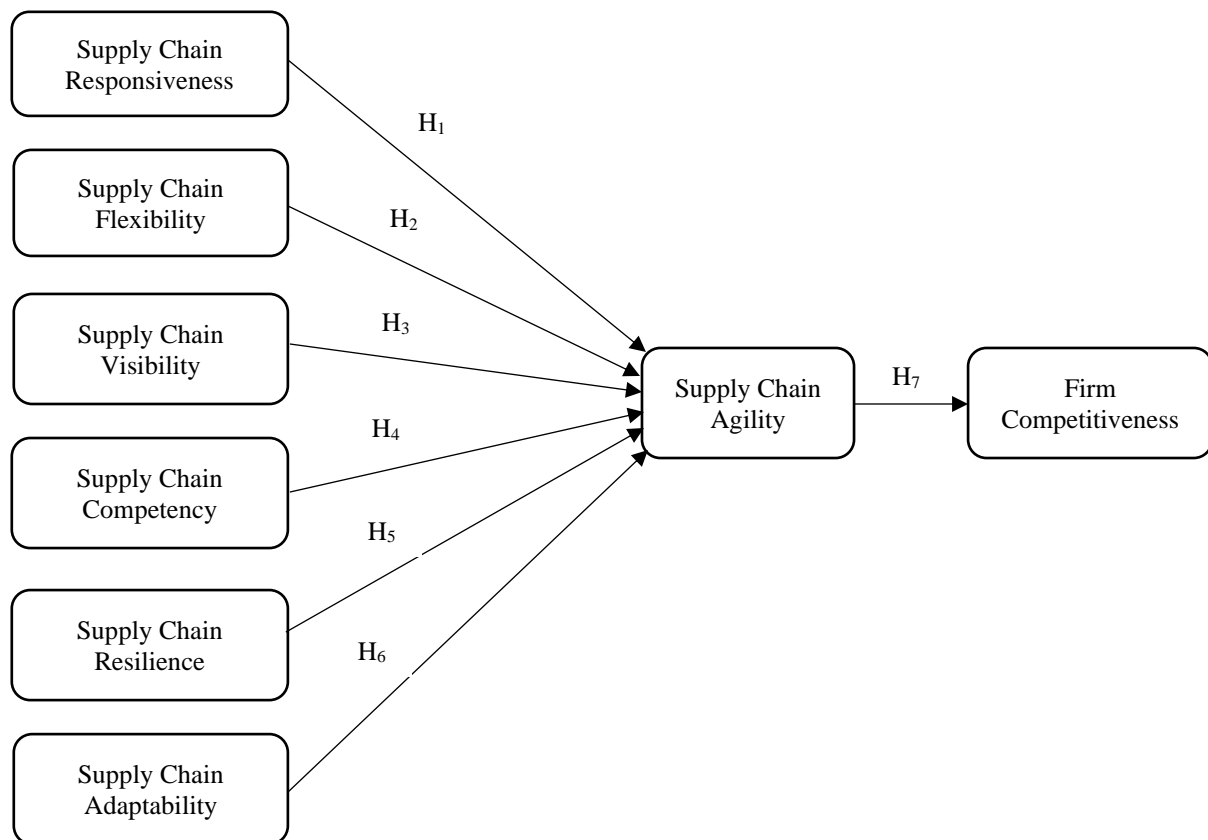
*H<sub>3</sub>: Supply chain visibility has a statistically significant effect on supply chain agility*

*H<sub>4</sub>: Supply chain competency has a statistically significant effect on supply chain agility*

*H<sub>5</sub>: Supply chain resilience has a statistically significant effect on supply chain agility*

*H<sub>6</sub>: Supply chain adaptability has a statistically significant effect on supply chain agility*

*H<sub>7</sub>: Supply chain agility has a statistically significant effect on firms' competitiveness*

**Figure 1: Proposed conceptual framework**

## 7. Limitations and conclusion

This study aims to provide a more comprehensive understanding of supply chain agility and competitiveness. To achieve this, the study identifies and highlights potential areas for further research. In order to improve a company's ability to compete in the market, the author of this article suggests a conceptual framework for supply chain agility. This study has comprehensively reviewed supply chain agility as a strategic enabler of firm competitiveness, synthesizing existing literature and proposing a conceptual framework for future research. The key findings of this research include:

- Supply chain agility is a multidimensional concept encompassing speed, adaptability, responsiveness, visibility, and flexibility.
- The literature on supply chain agility can be categorized into areas focusing on modeling enablers, adoption, implementation, and measurement for enhancing competitiveness.
- Supply chain agility is distinct from, yet related to, flexibility, leanness, adaptability, and resilience.

The proposed conceptual framework highlights the interrelationships between supply chain responsiveness, flexibility, visibility, competency, and resilience to supply chain agility and firm competitiveness.

From a practical perspective, this research offers valuable insights for supply chain managers seeking to enhance their organizations' competitiveness in volatile markets. The findings suggest that managers should focus on developing capabilities across multiple dimensions of supply chain agility while also considering the interplay between these dimensions.

From a scientific standpoint, this study contributes to the literature by providing a comprehensive review and synthesis of supply chain agility research. The proposed conceptual framework offers a foundation for future empirical studies to test and refine our understanding of how supply chain agility contributes to firm competitiveness.

However, this study has limitations that should be addressed in future research. First, the conceptual nature of the study calls for empirical validation of the proposed framework. Second, the

study's focus on literature from 1999 to 2024 may have excluded some relevant earlier works or emerging trends.

Future research directions include:

- Empirical testing of the proposed conceptual framework across different industries and cultural contexts.
- Investigation of the barriers to adoption and implementation of supply chain agility.
- Development of more sophisticated measurement techniques for supply chain agility.
- Exploration of the role of emerging technologies (e.g., AI, blockchain) in enhancing supply chain agility.
- Examination of supply chain agility in specific contexts such as healthcare, construction, agriculture, and humanitarian supply chains.

In conclusion, this study underscores the critical role of supply chain agility in enhancing firm competitiveness in today's dynamic business environment. Providing a comprehensive review and conceptual framework lays the groundwork for future research and practical applications in this critical area of supply chain management.

## Acknowledgment

## Funding

This research received no external funding.

## Conflicts of Interest

The author declares no conflict of interest.

## Citation information

Mogaka, C O., & Njururi, A. (2024). A systematic review and conceptual framework of supply chain agility as a strategic enabler of firm competitiveness. *Journal of Sustainable Development of Transport and Logistics*, 9(2), 109-125. doi:10.14254/jsdtl.2024.9-2.8.

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