ZIBELINE INTERNATIONAL™ PUBLISHING

ISSN: 2821-2983 (Online)
CODEN: MBMJAO

Malaysian Business Management Journal (MBMJ)

DOI: http://doi.org/10.26480/mbmj.02.2024.98.106

RESEARCH ARTICLE

ANALYZING THE INFLUENCE OF SUPPLY CHAIN FLEXIBILITY ON COMPETITIVE ADVANTAGE IN BANGLADESHI SMES

Sadia Rahman[a], Avishek Nath[b], Nusrat Jahan Barsa[c], Sharmin Ara Chowdhury[d]

[a] *American International University-Bangladesh and Edith Cowan University (ECU), Perth (Western Australia).*
[b] *American International University-Bangladesh, Dhaka, Bangladesh*
[c] *International University of Business Agriculture and Technology, Dhaka, Bangladesh*
[d] *Independent Researcher, Dhaka, Bangladesh*
**Corresponding Author Email: chowdhuryara.sharmin@gmail.com*

ARTICLE DETAILS

Article History:

Received 18 September 2024
Revised 21 October 2024
Accepted 27 November 2024
Available online 30 November 2024

ABSTRACT

This study analyzes the influence of supply chain flexibility on competitive advantage in Bangladeshi small and medium-sized enterprises (SMEs). By employing a quantitative approach and utilizing a sample of 250 SMEs, the research investigates various dimensions of supply chain flexibility, including supplier flexibility, production flexibility, delivery flexibility, inventory flexibility, and market responsiveness. The findings indicate a significant relationship between market responsiveness and competitive advantage, highlighting its crucial role in enhancing SMEs' positioning within the market. Conversely, the study found that other dimensions of supply chain flexibility did not show a statistically significant impact on competitive advantage. This research contributes to the understanding of supply chain dynamics in developing economies, particularly in the context of SMEs. Limitations include the study's focus on a single geographic region and the reliance on self-reported data, which may introduce biases. Practical implications suggest that SMEs should prioritize market responsiveness while developing their supply chain strategies, fostering agility and adaptability to changing market conditions. Socially, the research emphasizes the importance of supporting SMEs in building flexible supply chains to enhance their competitiveness and contribute to economic growth. This study's originality lies in its focused exploration of supply chain flexibility in Bangladeshi SMEs, filling a gap in the literature on supply chain management in developing countries.

KEYWORDS

Supply Chain Flexibility, Competitive Advantage, SMEs, Market Responsiveness, Bangladesh.

1. INTRODUCTION

In a period marked by rapid globalization and a continuously changing competitive environment, supply chain flexibility (SCF) has become an essential element for company survival and expansion. Businesses globally, irrespective of their scale or sector, encounter increasing market volatility, shifting customer tastes, and unforeseen external disturbances. These issues need a flexible strategy for supply chain management, particularly for small and medium-sized firms (SMEs) that often possess constrained resources and are more susceptible to abrupt alterations in their operational landscape. In developing nations such as Bangladesh, supply chain flexibility has emerged as a crucial strategy for SMEs to preserve competitiveness, ensure development, and tackle obstacles in both local and international markets. Bangladesh's economy has seen significant expansion over the last twenty years, mostly propelled by its flourishing SME sector.

Recent estimates indicate that SMEs substantially contribute to the nation's gross domestic product (GDP) and employment, serving a crucial function in economic growth. These firms often encounter many constraints, including restricted access to funding, insufficient infrastructure, regulatory obstacles, and external disruptions such as political instability and natural catastrophes (Chang et al., 2022). Moreover, global supply chain interruptions, such the COVID-19 pandemic and other geopolitical crises, have intensified the need for supply chain flexibility among firms worldwide. Bangladeshi SMEs must rapidly react to such interruptions to sustain operational efficiency and competitiveness (Emon and Khan, 2023). Consequently, comprehending the significance of supply chain flexibility in cultivating competitive advantage has been progressively pertinent for SMEs in the nation. Supply chain flexibility is the capacity of a corporation to react to unforeseen fluctuations in supply and demand and to adjust its operations to accommodate the changing requirements of its customers and suppliers (Shukor et al., 2021).

It includes several aspects, such as supplier flexibility, manufacturing flexibility, delivery flexibility, and inventory flexibility. Supplier flexibility denotes a company's capacity to swiftly modify its sourcing methods and supplier affiliations in response to fluctuating situations, such as supply deficiencies or changes in demand. Production flexibility encompasses the ability to adjust production techniques, quantities, and product varieties in reaction to changes in market demand. Delivery flexibility is the capacity to modify delivery schedules, techniques, and routes to meet client needs and address logistical obstacles. Ultimately, inventory flexibility denotes the organization's ability to adjust stock levels dynamically, facilitating the fulfillment of client demands without incurring significant costs or delays (Dubey et al., 2023). Competitive advantage refers to a firm's capacity to surpass its rivals by providing greater goods, services, or operational efficiency.

In supply chain management, competitive advantage may be attained by cost leadership, differentiation, or rapid responsiveness to market needs (Kharub et al., 2019). Small and medium-sized enterprises that efficiently use supply chain flexibility are more likely to attain a competitive edge, as

Quick Response Code	Access this article online	
	Website: www.mbmj.com.my	**DOI:** 10.26480/mbmj.02.2024.98.106

Cite The Article: Sadia Rahman, Avishek Nath, Nusrat Jahan Barsa, Sharmin Ara Chowdhury (2024). Analyzing the Influence of Supply Chain Flexibility on Competitive Advantage in Bangladeshi Smes. *Malaysian Business Management Journal, 3(2): 98.106.*

they can swiftly adapt to changes in client preferences, market trends, and external disruptions. By enhancing agility and adaptability, these companies may decrease lead times, elevate customer satisfaction, and maximize resource usage, hence augmenting competitiveness (Ralston and Blackhurst, 2020). The correlation between supply chain flexibility and competitive advantage is of considerable interest to both academics and practitioners, especially regarding SMEs in emerging nations. The impact of supply chain flexibility on competitive advantage is especially pertinent in Bangladesh, where SMEs are crucial to the economy but encounter considerable operational and competitive obstacles.

Numerous SMEs in Bangladesh function within very competitive sectors, including textiles, garments, and light manufacturing, where the capacity to rapidly adapt to changing market circumstances is essential for success. The nation's garment sector, which constitutes a substantial share of its exports, has seen heightened competition from other low-cost manufacturing nations, like Vietnam and Cambodia (Das et al., 2024). To remain competitive, Bangladeshi garment makers must constantly modify their supply chains to satisfy the requirements of foreign consumers, who often want rapid turnaround times, superior quality goods, and economical solutions. Consequently, supply chain flexibility emerges as a crucial factor in determining whether these enterprises can sustain their competitive advantage in global marketplaces. Furthermore, the significance of supply chain flexibility has been highlighted by recent global occurrences, such the COVID-19 pandemic, which disrupted supply networks globally and revealed weaknesses in conventional supply chain management methodologies (Moosavi et al., 2022).

The pandemic presented considerable hurdles for Bangladeshi SMEs, as several enterprises saw interruptions in raw material supply, labor shortages, and alterations in customer demand. SMEs who engaged in flexible supply chain procedures were more adept at adapting to disruptions by swiftly modifying their sourcing strategy, manufacturing processes, and delivery methods. Conversely, companies with inflexible supply networks have difficulties in managing disturbances, leading to delays, heightened expenses, and diminished competitiveness (Griffin et al., 2019). This underscores the essential function of supply chain flexibility in safeguarding company continuity and preserving a competitive edge during crises. Recent years have seen significant interest in research on supply chain flexibility, with several studies investigating its effects on corporate performance and competitive advantage.

A research by a group researchers shown that supply chain flexibility enhances operational performance by allowing enterprises to adapt more adeptly to market uncertainty (Irfan et al., 2019). Similarly shown that supply chain flexibility augments competitive advantage by enhancing a firm's capacity to satisfy consumer demands and adjust to changing market circumstances (Juan and Li, 2023). Recent studies have emphasized the significance of supply chain flexibility in alleviating the impact of external shocks, such natural catastrophes and worldwide pandemics, on corporate performance (Delbufalo, 2022). Although there is an increasing amount of literature on supply chain flexibility, research on its specific influence on competitive advantage inside SMEs in emerging countries, especially in Bangladesh, remains scarce. Although many studies have investigated the impact of supply chain management on the competitiveness of Bangladeshi SMEs, little research has concentrated on the idea of flexibility and its effect on competitive results.

This lacuna in the literature offers an opportunity to investigate how supply chain flexibility enhances the competitive advantage of SMEs in Bangladesh, considering the unique problems and possibilities encountered by these enterprises. This research aims to examine the impact of supply chain flexibility on the competitiveness of Bangladeshi SMEs, recognizing its significance in attaining competitive advantage. The research specifically examines five critical elements of supply chain flexibility: supplier flexibility, manufacturing flexibility, delivery flexibility, inventory flexibility, and market responsiveness. The dimensions are analyzed concerning their influence on competitive advantage, assessed by parameters like cost efficiency, customer satisfaction, market responsiveness, and operational agility. The research seeks to elucidate how Bangladeshi SMEs may use supply chain flexibility to improve their competitive standing in local and international markets via the analysis of the link between these factors.

This study employs a quantitative research technique, using a structured questionnaire to gather data from a sample of SMEs in Bangladesh. The questionnaire aims to gather the perspectives of SME managers and supply chain specialists about the flexibility of their supply chain operations and the competitive benefits obtained from these practices. The acquired data is evaluated via statistical methods to ascertain the correlations between the independent variables (dimensions of supply chain flexibility) and the dependent variable (competitive advantage). This study's results are anticipated to enhance the current literature on supply chain management and competitive advantage, especially for SMEs in emerging nations.

2. Literature Review

The discourse on supply chain flexibility and its influence on competitive advantage has advanced considerably in recent decades. As enterprises increasingly acknowledge the significance of agile supply chain management, academics and professionals have concentrated on delineating the elements of flexibility that enhance competitive performance. Supply chain flexibility is sometimes seen as a multidimensional construct that includes several facets of a company's supply chain operations. Research demonstrates that adaptability in supplier relationships, manufacturing methodologies, delivery timelines, and inventory control may markedly improve a firm's responsiveness to market fluctuations and sustain a competitive advantage (Belhadi et al., 2024). Historically, supply chain flexibility was primarily seen in terms of operational efficiency, with companies aiming to reduce costs and optimize procedures.

Nevertheless, the advent of dynamic market conditions marked by rapid technical progress and evolving customer demands has broadened the comprehension of supply chain flexibility to include a more strategic viewpoint. A group researchers contend that supply chain flexibility enhances operational performance and is vital for strategic positioning, allowing enterprises to seize fresh opportunities and adeptly manage difficulties (Arda et al., 2023). This strategic perspective on flexibility corresponds with the resource-based view (RBV) of the company, which asserts that distinctive skills, such as supply chain flexibility, may result in enduring competitive advantage (Ustundağ and Ungan, 2020). Recent studies have highlighted the significance of certain aspects of supply chain flexibility, including supplier flexibility, manufacturing flexibility, and logistical flexibility, in improving competitive advantage. Supplier flexibility denotes a supplier's capacity to swiftly adapt to fluctuations in demand or supply circumstances (Ramanathan et al., 2021).

This aspect is especially important for SMEs, since they often depend on a restricted pool of suppliers and have heightened risks related to supply interruptions. Studies indicate that companies that cultivate collaborative partnerships with their suppliers are more adept at using supplier flexibility, resulting in enhanced performance results (Irfan et al., 2019). Moreover, improved supplier flexibility enables companies to alleviate risks linked to supply shortages and variations in raw material costs, so fostering a more robust supply chain. Production flexibility, a crucial aspect of supply chain flexibility, denotes a firm's capability to modify its production processes and capacity in response to fluctuating demand (Guenther and Guenther, 2021). This facet of flexibility is crucial for sustaining competitiveness in sectors marked by rapid product life cycles and fluctuating customer preferences. Research demonstrates that companies exhibiting elevated production flexibility may swiftly modify their operations to meet market needs, hence enhancing consumer happiness and retention (Anning-Dorson and Nyamekye, 2020).

Moreover, manufacturing flexibility allows companies to develop and launch new goods swiftly, which is essential for maintaining a competitive edge in dynamic marketplaces. Delivery flexibility, referring to the capacity to modify delivery schedules and procedures according to client needs, has been recognized as a crucial factor in achieving competitive advantage (Shukor et al., 2021). In the current business, consumers increasingly want expedited delivery times and more adaptable shipping alternatives. Companies that can meet these demands via flexible logistics and distribution methods are more likely to improve consumer happiness and loyalty. Research reveals that delivery flexibility may increase a firm’s response to market changes and boost its overall competitive position (Irfan et al., 2022). Inventory flexibility, indicative of a firm's capacity to flexibly control inventory levels, is a vital aspect of supply chain flexibility.

This factor is especially pertinent for SMEs, which often function with constrained resources and must reconcile inventory expenses with service quality. Research indicates that companies implementing flexible inventory management strategies, including just-in-time (JIT) systems and demand-driven replenishment, can more adeptly respond to demand fluctuations and mitigate the risks of overstocking or stockouts (Tian et al., 2023). Thus, inventory flexibility may enhance operational efficiency and customer satisfaction, ultimately strengthening competitive advantage. The correlation between supply chain flexibility and competitive advantage has been extensively examined via empirical study. A meta-analysis conducted by demonstrates a favorable association between supply chain flexibility and other performance indicators, such as

operational performance, customer satisfaction, and overall company success (El-Khalil and Mezher, 2020).

The authors contend that companies who engage in adaptable supply chain strategies are more effectively equipped to address market uncertainty, thereby securing a competitive advantage. A research by a group researchers highlights that supply chain flexibility is positively correlated with a firm's capacity to innovate, adapt to changes, and fulfill consumer requests, hence supporting its significance in attaining competitive advantage (Gligor et al., 2019). The literature identifies distinct problems and possibilities affecting the link between supply chain flexibility and competitive advantage among Bangladeshi SMEs. Small and medium-sized enterprises in Bangladesh often have resource limitations, restricted access to technology, and insufficient infrastructure, which may impede their capacity to successfully adopt flexible supply chain methods (Benzidia and Makaoui, 2020).

Notwithstanding these hurdles, Bangladeshi SMEs have distinctive advantages, including robust partnerships with local suppliers and a profound understanding of domestic market dynamics, which may enhance supply chain flexibility. Studies indicate that SMEs who use these advantages to develop adaptable supply chains may enhance their competitiveness in both domestic and global markets (Belhadi et al., 2024). Furthermore, the influence of external variables on supply chain flexibility and competitive advantage in Bangladeshi SMEs is significant. Recent global occurrences, such the COVID-19 pandemic, have exposed the weaknesses of supply networks globally and emphasized the need of adaptability for sustaining business continuity (Seuring et al., 2022). Numerous SMEs in Bangladesh saw considerable difficulties during the epidemic, especially in procuring raw materials and executing client orders.

Nevertheless, entities who had earlier adopted flexible supply chain methods were more adept at navigating the problems presented by the crisis, underscoring the essential function of supply chain flexibility in maintaining resilience and competitiveness (Belhadi et al., 2024). The swiftly evolving technical environment, with external shocks, poses both problems and possibilities for Bangladeshi SMEs regarding supply chain flexibility. The emergence of digital technologies, including artificial intelligence (AI), the Internet of Things (IoT), and big data analytics, has the capacity to improve supply chain visibility and responsiveness (Dubey et al., 2022). Nevertheless, several SMEs in Bangladesh face challenges in adopting these technologies owing to budgetary limitations and insufficient technical proficiency. Research demonstrates that SMEs using digital technology to improve supply chain flexibility are more likely to get a competitive edge in the market (Iranmanesh et al., 2023).

Moreover, the influence of government policies and support systems in enhancing supply chain flexibility among Bangladeshi SMEs need additional investigation. Government actions designed to enhance infrastructure, improve access to financing, and encourage technology adoption may substantially influence the capacity of SMEs to establish adaptable supply chains (Dey et al., 2024). Research indicates that certain government actions may create conditions that promote supply chain flexibility, allowing SMEs to improve their competitive standing and support economic development (Machado et al., 2020). Despite the expanding literature on supply chain flexibility and competitive advantage, some gaps and restrictions need consideration. Much of the current research has concentrated on big firms, with few empirical studies investigating the unique setting of SMEs, especially in emerging nations.

Moreover, while several aspects of supply chain flexibility have been recognized, the interaction among these dimensions and their combined effect on competitive advantage is still little examined. Further study is required to get a more thorough understanding of the interactions among various elements of supply chain flexibility and their impact on overall company performance within SMEs. The literature emphasizes the vital role of supply chain flexibility in improving competitive advantage, especially for SMEs in dynamic and demanding situations. Critical aspects of supply chain flexibility, such as supplier flexibility, production flexibility, delivery flexibility, and inventory flexibility, have demonstrated a positive impact on a firm's capacity to adapt to market fluctuations and attain exceptional performance results.

Within the framework of Bangladeshi SMEs, the correlation between supply chain flexibility and competitive advantage is influenced by several factors, including resource limitations, technological progress, external disruptions, and governmental assistance. As the global business environment evolves, understanding the significance of supply chain flexibility in enhancing competitiveness will be crucial for SMEs aiming to succeed in more competitive marketplaces. Future study must investigate the particular dynamics of supply chain flexibility in SMEs within emerging countries, solving current literature gaps and offering practical insights for practitioners and policymakers.

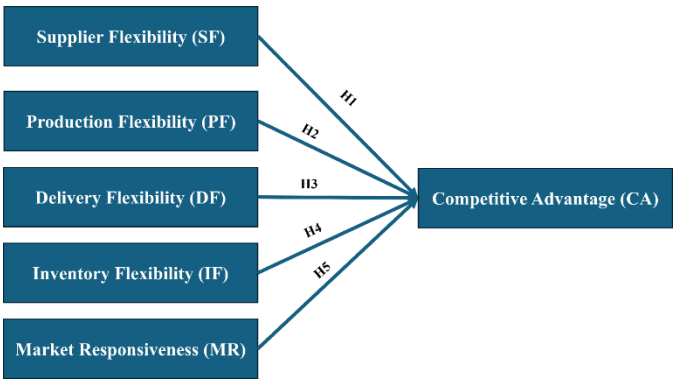

Figure 1: Research Framework

3.Research Methodology

This study used a quantitative technique to examine the impact of supply chain flexibility on competitive advantage in Bangladeshi SMEs. A systematic questionnaire was created to gather data from SMEs in several industries across Bangladesh. The survey instrument had inquiries pertaining to the facets of supply chain flexibility, including supplier flexibility, production flexibility, delivery flexibility, and inventory flexibility, with questions on the perceived competitive advantage of the businesses. The sample size was established at 250 respondents, considered sufficient for the intended statistical analyses of this study. Participants were selected using a non-probability sampling approach, especially purposive sampling, to guarantee that respondents had relevant expertise in supply chain management and held decision-making positions within their firms.

The surveys were disseminated via email and social media channels, enabling broader accessibility across various geographical regions in Bangladesh. Data collection occurred over three months, during which follow-up reminders were sent to non-respondents to improve the response rate. Upon completion of the data collecting phase, the answers were aggregated and analyzed using the Statistical Package for the Social Sciences (SPSS) software. The gathered data underwent many preprocessing procedures, including data cleansing to eliminate incomplete replies and to assess the validity and reliability of the questionnaire. The investigation used descriptive statistics to encapsulate the demographic traits of the respondents and inferential statistics to investigate the correlations between supply chain flexibility and competitive advantage.

Correlation analysis was conducted to ascertain the degree and direction of the correlations among the different characteristics of supply chain flexibility and the overall competitive advantage. Additionally, regression analysis was performed to evaluate the predictive capacity of supply chain flexibility on competitive advantage, enabling the identification of the most relevant aspects in driving competitive outcomes for Bangladeshi SMEs. To maintain the study's rigor, the research complied with ethical requirements by obtaining informed permission from participants and safeguarding the anonymity of their replies. This quantitative analysis aimed to enrich the current understanding of supply chain management in SMEs, especially in developing nations such as Bangladesh, and to offer practical insights for practitioners striving to improve their competitive advantage through enhanced supply chain practices. The study sought to underscore the importance of supply chain flexibility as a strategic advantage for SMEs, facilitating their navigation of the complexity of the contemporary business environment.

4.Results

4.1 Reliability Statistics

The reliability data in Table 1 reveal a Cronbach's Alpha score of 0.902, indicating that the instrument used in this investigation exhibits high internal consistency. Cronbach's Alpha is a commonly used metric for evaluating the reliability of a collection of items or questions in a questionnaire. A Cronbach's Alpha score over 0.9 indicates a substantial level of dependability, suggesting that the items are assessing a coherent underlying concept (Emon et al., 2024). The questionnaire, including 20 questions, yielded a Cronbach's Alpha of 0.904 based on standardized items, reinforcing the evidence of good internal consistency. The resemblance between the two results indicates that the reliability of the

items is maintained regardless of standardization, hence affirming the measuring tool's resilience.

This degree of dependability is crucial for guaranteeing that the data gathered correctly represents the constructs being assessed—in this case, the facets of supply chain flexibility and their impact on competitive advantage. The elevated reliability suggests that the questionnaire questions are likely to provide consistent results across various samples, hence bolstering the legitimacy of the study outcomes. When evaluating structures such as supply chain flexibility, which are multifaceted and intricate, a dependable assessment tool is essential for deriving solid conclusions about their influence on competitive advantage.

Table 1: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.902	.904	20

4.2 Descriptive Statistics

Table 2's descriptive data provide significant insights into respondents' assessments of supply chain flexibility and its impact on competitive advantage among Bangladeshi SMEs. Each question was assessed using a 5-point Likert scale, with a higher mean value signifying more agreement with the statement. The item "Our logistics team can quickly change delivery routes to overcome transport issues" has the highest mean score (Mean = 4.36, SD = .759), indicating that respondents typically view their logistics teams as highly adaptable and proficient in addressing transport challenges. The considerable flexibility in logistics signifies a notable strength in the supply chain operations of the examined SMEs. Correspondingly, aspects pertaining to delivery flexibility, such as "We maintain flexibility in managing delivery volumes, ensuring on-time delivery even during peak demand" (Mean = 4.31, SD = .796), and "Our business can easily switch between suppliers when needed" (Mean = 4.26, SD = .728), garnered elevated mean scores.

These replies demonstrate that flexibility in sourcing and delivery is firmly established, enabling firms to effectively manage supplier relationships and customer deliveries, which are essential elements of a responsive supply chain. Additional aspects of supply chain flexibility, including the capacity to modify production processes ("Our production processes enable us to alter product specifications with minimal downtime," Mean = 3.98, SD = .986) and adaptability in inventory management ("We can swiftly adjust inventory levels to prevent stockouts or overstocking," Mean = 4.01, SD = 1.045), also garnered comparatively high evaluations. The findings indicate that the majority of SMEs in the sample has the ability to manage changes in production and inventory efficiently, hence enhancing overall supply chain agility. Regarding competitive advantage, the statements "Our business has a competitive advantage due to our ability to respond quickly to market changes" (Mean = 3.91, SD = .950) and "Supply chain flexibility has helped us outperform our competitors in terms of customer satisfaction and market share" (Mean = 3.94, SD = .990) indicate that respondents predominantly concur that supply chain flexibility contributes positively to their businesses' competitive edge.

Nonetheless, the somewhat lower averages relative to other supply chain flexibility factors indicate that, while SMEs acknowledge the significance of flexibility, there exists potential for improvement in effectively using this flexibility to continually surpass rivals. The standard deviations among items are very low, suggesting that answers were mostly constant across the sample. Items with elevated standard deviations, such as "We can quickly adjust our production output to meet sudden changes in customer demand" (SD = .932), indicate more heterogeneity in the perceptions of various organizations about their adaptability in certain domains. This diversity may suggest that although some organizations possess robust processes, others may have difficulties in sustaining flexibility in certain areas.

Table 2: Descriptive Statistics

Items	N	Mean	Std. Deviation
Our business can easily switch between suppliers when needed.	250	4.26	.728
We have long-term relationships with suppliers that enable flexibility in sourcing materials.	250	4.23	.654
Our suppliers are capable of meeting changes in order volumes without significant delays.	250	4.20	.879
We can negotiate flexible delivery terms with our suppliers during supply chain disruptions.	250	4.00	.938
Our production processes allow us to change product specifications with minimal downtime.	250	3.98	.986
We can quickly adjust our production output to meet sudden changes in customer demand.	250	3.88	.932
Our manufacturing setup allows us to introduce new products without major adjustments.	250	4.06	.892
We have the ability to produce multiple product types with existing equipment.	250	3.96	.950
We can modify delivery schedules easily to suit customer requirements.	250	3.98	.873
Our logistics team can quickly change delivery routes to overcome transport issues.	250	4.36	.759
We offer various delivery options to our customers (e.g., express shipping, regular delivery).	250	4.09	.860
We maintain flexibility in managing delivery volumes, ensuring on-time delivery even during peak demand.	250	4.31	.796
Our inventory system allows us to adjust stock levels based on changing market demand.	250	4.04	1.046
We can increase or decrease inventory quickly to avoid stockouts or overstocking.	250	4.01	1.045
Our inventory management is integrated with our supply chain, allowing for rapid changes in procurement and distribution.	250	4.11	.996
We can easily source additional inventory when faced with unexpected demand surges.	250	4.20	.830
We monitor market trends to quickly adjust our supply chain strategies.	250	4.23	.688
We regularly update our products/services in response to changes in customer preferences.	250	4.19	.847
Our business has a competitive advantage due to our ability to respond quickly to market changes.	250	3.91	.950
Supply chain flexibility has helped us outperform our competitors in terms of customer satisfaction and market share.	250	3.94	.990
Valid N (listwise)	250		

4.3 Correlation among the Variables

The correlation matrix elucidates the relationships among different dimensions of supply chain flexibility (supplier flexibility, production flexibility, delivery flexibility, inventory flexibility, and market responsiveness) and their influence on competitive advantage within Bangladeshi SMEs. The matrix contains Pearson correlation coefficients that indicate the strength and direction of links among the variables, along with significance levels (p-values) to evaluate the statistical significance of the correlations. Supplier flexibility has robust positive associations with many measures of supply chain flexibility: production flexibility ($r = 0.823$, $p < 0.001$), delivery flexibility ($r = 0.743$, $p < 0.001$), and inventory flexibility ($r = 0.525$, $p < 0.001$). This indicates that SMEs with more supplier flexibility are likely to possess enhanced production, delivery, and inventory flexibility.

The robust association with production flexibility suggests that sourcing flexibility is intimately linked to the capacity to modify production processes, hence facilitating prompt modifications to satisfy market needs. Production flexibility has substantial associations with delivery flexibility ($r = 0.633$, $p < 0.001$) and inventory flexibility ($r = 0.608$, $p < 0.001$). various results suggest that companies capable of swiftly adapting their manufacturing capacities may also manage their delivery and inventory more efficiently, underscoring the interrelatedness of various supply chain elements. Furthermore, production flexibility has a modest association with competitive advantage ($r = 0.188$, $p = 0.003$), indicating that companies capable of producing diverse items or swiftly adapting may get a competitive edge in their market. Delivery flexibility has a significant correlation with inventory flexibility ($r = 0.682$, $p < 0.001$) and competitive advantage ($r = 0.143$, $p = 0.024$).

This indicates that organizations capable of efficiently managing their delivery schedules and procedures are also likely to sustain adaptable inventory systems, which is essential for assuring customer happiness and prompt order fulfillment. The association with competitive advantage, albeit less pronounced than other dimensions, suggests that good delivery tactics enhance a firm's overall competitive stance. Inventory flexibility has a significant connection with competitive advantage ($r = 0.133$, $p = 0.035$), underscoring the premise that the capacity to flexibly manage inventory levels—modulating stock in response to demand variations—can enhance competitive performance. Nevertheless, it has a lesser link with other aspects of flexibility in comparison to supplier and production flexibility.

Market Responsiveness has a positive link with competitive advantage ($r = 0.460$, $p < 0.001$). This suggests that companies that adapt to market changes and trends are more likely to attain competitive advantages. The association with dimensions of supply chain flexibility, however modest (e.g., $r = 0.190$ with supplier flexibility and $r = 0.130$ with production flexibility), indicates that while market response is essential, it is also influenced by the total flexibility of the supply chain. The strongest association in the matrix exists between supplier flexibility and production flexibility, suggesting that improving supplier relationships may directly affect production adaptability. The findings underscore the significance of interrelated flexibility characteristics in attaining competitive advantage within Bangladeshi SMEs. Companies that emphasize and improve their flexibility across all facets of the supply chain are more likely to adapt efficiently to market needs, therefore placing themselves advantageously against rivals.

Table 3: Correlation among the Variables

Constructs		Supplier Flexibility	Production Flexibility	Delivery Flexibility	Inventory Flexibility	Market Responsiveness	Competitive Advantage
Supplier Flexibility	Pearson Correlation	1	.823**	.743**	.525**	.190**	.231**
	Sig. (2-tailed)		.000	.000	.000	.003	.000
	N	250	250	250	250	250	250
Production Flexibility	Pearson Correlation	.823**	1	.633**	.608**	.130*	.188**
	Sig. (2-tailed)	.000		.000	.000	.040	.003
	N	250	250	250	250	250	250
Delivery Flexibility	Pearson Correlation	.743**	.633**	1	.682**	.120	.143*
	Sig. (2-tailed)	.000	.000		.000	.058	.024
	N	250	250	250	250	250	250
Inventory Flexibility	Pearson Correlation	.525**	.608**	.682**	1	.086	.133*
	Sig. (2-tailed)	.000	.000	.000		.175	.035
	N	250	250	250	250	250	250
Market Responsiveness	Pearson Correlation	.190**	.130*	.120	.086	1	.460**
	Sig. (2-tailed)	.003	.040	.058	.175		.000
	N	250	250	250	250	250	250
Competitive Advantage	Pearson Correlation	.231**	.188**	.143*	.133*	.460**	1
	Sig. (2-tailed)	.000	.003	.024	.035	.000	
	N	250	250	250	250	250	250

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.4 Regression Analysis

Table 4 provides the model summary for the regression analysis aimed at assessing the impact of supply chain flexibility dimensions—namely market responsiveness, inventory flexibility, supplier flexibility, delivery flexibility, and production flexibility—on competitive advantage within Bangladeshi SMEs. An R value of 0.486 indicates a moderate positive connection between the independent variables (different measures of supply chain flexibility) and the dependent variable (competitive advantage). This indicates that an increase in supply chain flexibility dimensions correlates with an enhancement in competitive advantage. The R Square (R^2) score of 0.236 indicates that around 23.6% of the variability in competitive advantage is elucidated by the five aspects of supply chain flexibility used in the model. our figure signifies a substantial fraction of the variation, although it implies the existence of other elements not included in our investigation that might affect competitive advantage in Bangladeshi SMEs.

The Adjusted R Square score of 0.220 offers a more precise assessment by considering the quantity of predictors in the model. It indicates that, even after accounting for the number of independent factors, over 22% of the variability in competitive advantage may still be attributed to the dimensions of supply chain flexibility.

The little decrease in the R^2 value suggests that the model retains a satisfactory fit despite the addition of many factors. The Standard Error of the Estimate is 0.80036, indicating the mean deviation of the observed data from the regression line. A reduced standard error signifies a better model fit to the data, whereas an increased standard error implies more variability in the predictions. A standard error of 0.80036 signifies a degree of prediction error, although it remains within a range that implies the model is effective in elucidating competitive advantage.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.486[a]	.236	.220	.80036

a. Predictors: (Constant), Market Responsiveness, Inventory Flexibility, Supplier Flexibility, Delivery Flexibility, Production Flexibility

Table 5 presents the results of the ANOVA (Analysis of Variance) for the regression model examining the influence of supply chain flexibility dimensions—market responsiveness, inventory flexibility, supplier flexibility, delivery flexibility, and production flexibility—on competitive advantage among Bangladeshi SMEs. The Sum of Squares for the Regression is 48.255, which represents the variation in the dependent variable (competitive advantage) that can be explained by the independent variables included in the model. The Residual Sum of Squares is 156.301, which indicates the variation that is not explained by the model. The Total Sum of Squares is the sum of the regression and residual sums of squares, amounting to 204.556. The degrees of freedom (df) for the regression model is 5 (the number of predictors), while the degrees of freedom for the residual is 244 (total observations minus the number of predictors minus one). This results in a total of 249 degrees of freedom. The Mean Square values are calculated by dividing the sum of squares by their respective degrees of freedom. The Mean Square for Regression is calculated as 48.255 5 = 9.651 5 48.255 =9.651 and for Residual as 156.301 244 ≈ 0.641 244 156.301 ≈0.641. The F-statistic is computed by dividing the Mean Square for Regression by the Mean Square for Residual, resulting in 9.651 0.641 = 15.066 0.641 9.651 =15.066. The F-statistic assesses the overall significance of the regression model, indicating whether the independent variables significantly explain the variability in the dependent variable. The Sig. (p-value) associated with the F-statistic is reported as 0.000. This value is less than the conventional significance level of 0.05, suggesting that there is a statistically significant relationship between the independent variables and competitive advantage. In practical terms, this means that at least one of the predictors (supply chain flexibility dimensions) has a significant effect on competitive advantage, providing strong evidence that supply chain flexibility is an important factor in enhancing competitive advantage for Bangladeshi SMEs.

Table 5: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.255	5	9.651	15.066	.000[b]
	Residual	156.301	244	.641		
	Total	204.556	249			

a. Dependent Variable: Competitive Advantage

b. Predictors: (Constant), Market Responsiveness, Inventory Flexibility, Supplier Flexibility, Delivery Flexibility, Production Flexibility

Table 6 displays the coefficients derived from the regression analysis examining the influence of supply chain flexibility dimensions—supplier flexibility, manufacturing flexibility, delivery flexibility, inventory flexibility, and market responsiveness—on the competitive advantage of Bangladeshi SMEs. The constant value of 0.523 signifies that when all independent variables are zero, the anticipated competitive advantage is 0.523; nevertheless, this result lacks statistical significance (p = 0.257). Supplier Flexibility exhibits a coefficient of 0.254 (p = 0.142), indicating a positive correlation with competitive advantage that lacks statistical significance, whereas Production Flexibility demonstrates a negligible effect (coefficient = 0.006, p = 0.963), signifying it does not substantially impact competitive advantage. The coefficient for Delivery Flexibility is -0.111 (p = 0.418), indicating that increased delivery flexibility may correlate with a reduction in competitive advantage, but this finding is statistically insignificant. Inventory Flexibility has a coefficient of 0.070 (p = 0.506), so underscoring the absence of a meaningful effect on competitive advantage. Conversely, Market Responsiveness exhibits a robust and statistically significant correlation, with a coefficient of 0.593 (p = 0.000), indicating that heightened market responsiveness correlates with a considerable enhancement in competitive advantage, so establishing it as a vital predictor. The analysis indicates that, although supply chain flexibility dimensions exert some influence, only market responsiveness is a significant factor in augmenting competitive advantage, underscoring the necessity for adaptability to market fluctuations and customer requirements among Bangladeshi SMEs.

Table 6: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.523	.461		1.135	.257
	Supplier Flexibility	.254	.172	.175	1.474	.142
	Production Flexibility	.006	.125	.005	.047	.963
	Delivery Flexibility	-.111	.136	-.080	-.811	.418
	Inventory Flexibility	.070	.105	.055	.666	.506
	Market Responsiveness	.593	.079	.431	7.551	.000

a. Dependent Variable: Competitive Advantage

5. Discussion

The examination of supply chain flexibility's impact on competitive advantage in Bangladeshi SMEs uncovers numerous significant insights that enhance our comprehension of the sector's dynamics. The findings reveal that, among the elements of supply chain flexibility analyzed, only market responsiveness was identified as a statistically significant predictor of competitive advantage. This indicates that for SMEs in Bangladesh, the capacity to swiftly adapt to market needs and fluctuations is crucial for achieving a competitive advantage. In the current dynamic business landscape, marked by variable customer tastes and economic volatility, the ability to react swiftly may differentiate successful companies from their rivals. The favorable correlation between market responsiveness and competitive advantage highlights the need for SMEs to improve their responsiveness tactics.

Enterprises that can rapidly adapt their operations, product lines, and marketing strategies to align with consumer needs are more strategically positioned to seize market opportunities and alleviate possible dangers. This discovery corresponds with the current research highlighting the essential function of responsiveness in attaining exceptional performance in dynamic markets (Kumar et al., 2020; Li et al., 2022). It recommends that SMEs in Bangladesh prioritize investments in systems and procedures that enable real-time market analysis, customer feedback channels, and rapid decision-making. Conversely, the other characteristics of supply chain flexibility—supplier flexibility, manufacturing flexibility, delivery flexibility, and inventory flexibility—failed to exhibit statistically significant correlations with competitive advantage. The insignificance of supplier flexibility suggests that, while adaptable suppliers are advantageous, they do not immediately provide a competitive edge for SMEs in the present situation.

This may result from many variables, including the characteristics of supplier relationships in Bangladesh, where long-term collaborations are less prevalent than in bigger firms or more established markets. Moreover, the impact of production and delivery flexibility may be eclipsed by other operational difficulties encountered by SMEs, including resource limitations, infrastructure limits, and market accessibility concerns. The identified unfavorable correlation between delivery flexibility and competitive advantage prompts essential inquiries about operational strategies inside SMEs. It may indicate that enhanced delivery flexibility, which often entails more expenses and complexity, does not inherently result in superior competitive standing. Small and medium-sized enterprises must combine flexibility and efficiency, ensuring that delivery capabilities correspond with genuine market needs rather than only

prioritizing flexibility as an isolated objective. Furthermore, the results underscore the need of inventory flexibility, notwithstanding a non-significant correlation.

Adjusting inventory levels according to market needs is crucial, particularly in a volatile market such as Bangladesh. Nevertheless, the findings suggest that having flexible inventory management systems alone is inadequate for attaining a competitive advantage. Small and medium-sized enterprises may need to include inventory management into comprehensive supply chain strategies that encompass forecasting, demand planning, and supplier coordination. Given these results, it is essential for policymakers and industry partners in Bangladesh to create an environment that promotes market responsiveness and supply chain agility. This may include offering training and resources for SMEs to embrace contemporary technology, such as data analytics and artificial intelligence, which may enhance their ability to assess market trends and customer behavior more efficiently.

Moreover, promoting cooperation between SMEs and bigger enterprises or industry networks may facilitate information exchange and resource aggregation, hence improving overall supply chain competencies. This research underscores the significance of market responsiveness as a pivotal factor for competitive advantage in Bangladeshi SMEs, while also posing essential inquiries on the roles of other dimensions of supply chain flexibility. The findings from this study may guide management practices and governmental actions designed to enhance the competitiveness of SMEs in Bangladesh. Future study may investigate the fundamental causes of the observed correlations, analyze sector-specific intricacies, and assess the influence of external variables, like economic circumstances and technological progress, on supply chain flexibility and competitive advantage.

6.Conclusion

This study analysis underscores the critical importance of supply chain flexibility in shaping competitive advantage for Bangladeshi SMEs. The results highlight the essential significance of market responsiveness as a crucial element that directly influences competitive positioning. In a rapidly evolving and competitive landscape, the capacity of SMEs to promptly adjust to changing market circumstances, customer preferences, and new possibilities is crucial for attaining and sustaining a competitive advantage. The significant association between market responsiveness and competitive advantage indicates that SMEs have to emphasize the formulation of agile supply chain strategies that provide rapid adaptations in their operations and products. In contrast, the study indicated that various aspects of supply chain flexibility, including supplier flexibility, production flexibility, delivery flexibility, and inventory flexibility, did not demonstrate statistically significant correlations with competitive advantage among Bangladeshi SMEs.

This highlights significant implications about the operational tactics used by these enterprises and suggests the need for a sophisticated comprehension of how different aspects of flexibility interrelate and impact overall performance. The discovered negative correlation between delivery flexibility and competitive advantage indicates that just enhancing delivery flexibility may be inadequate and might result in inefficiencies that undermine competitiveness. The ramifications of these discoveries are dual. Initially, SMEs have to prioritize improving their market responsiveness by investing in technology and procedures that enable real-time market analysis and customer interaction. Implementing data-driven decision-making and cultivating a culture of agility will enable SMEs to adapt adeptly to market swings and capitalize on emerging possibilities.

Secondly, industry players and policymakers must collaborate to provide a conducive climate that facilitates SMEs in cultivating adaptable and responsive supply chains. This include providing access to training, resources, and technology that may augment supply chain capabilities. This research highlights that, while supply chain flexibility is crucial for competitive advantage, market responsiveness is essential for Bangladeshi SMEs. This study enhances the current understanding of supply chain management by identifying the particular elements that foster competitive advantage in this distinct environment. Future study may focus on examining the interplay between various aspects of supply chain flexibility and assessing the influence of external variables on the supply chain dynamics of SMEs in Bangladesh. By adopting the lessons from this research, SMEs may enhance their positioning for sustainable development and competitiveness in a dynamic economy.

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