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Article

Evaluating the Impact of Supply Chain Flexibility on Gaining Competitive Advantage in Bangladeshi SMEs

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Abstract: This research examines the impact of supply chain flexibility on competitive advantage inside Bangladeshi small and medium-sized companies (SMEs). This study employs a quantitative methodology and analyzes a sample of 250 SMEs to examine many facets of supply chain flexibility, including supplier flexibility, production flexibility, delivery flexibility, inventory flexibility, and market responsiveness. The results demonstrate a substantial correlation between market responsiveness and competitive advantage, underscoring its vital importance in improving SMEs' market standing. In contrast, the research revealed that other aspects of supply chain flexibility did not have a statistically significant effect on competitive advantage. This study enhances the comprehension of supply chain dynamics in emerging economies, specifically for small and medium-sized enterprises (SMEs). The research is constrained by its concentration on a single geographic area and its dependence on self-reported data, potentially introducing biases. Practical implications indicate that SMEs have to emphasize market responsiveness in formulating their supply chain strategy, hence enhancing agility and flexibility to changing market circumstances. The study underscores the need of assisting SMEs in developing adaptable supply chains to improve their competitiveness and foster economic development. The novelty of this research is in its concentrated examination of supply chain flexibility within Bangladeshi SMEs, addressing a deficiency in the literature of supply chain management in developing nations.

Keywords: supply chain flexibility; competitive advantage; SMEs; market responsiveness; Bangladesh

1. Introduction

In an era characterized by rapid globalization and an ever-evolving competitive landscape, supply chain flexibility (SCF) has emerged as a crucial factor for corporate survival and growth. Businesses worldwide, regardless of size or industry, face increasing market volatility, changing consumer preferences, and unexpected external disruptions. These challenges need an adaptable approach for supply chain management, especially for small and medium-sized enterprises (SMEs) that often have less resources and are more vulnerable to sudden changes in their operating environment. In developing countries like Bangladesh, supply chain flexibility has become an essential approach for SMEs to maintain competitiveness, facilitate growth, and address challenges in both domestic and global markets. Bangladesh's economy has seen substantial growth over the last two decades, mostly driven by its thriving SME sector. Recent estimates suggest that SMEs significantly contribute to the nation's gross domestic product (GDP) and employment, playing a vital role in economic development. These companies often face several limitations, including limited access to capital, inadequate infrastructure, regulatory challenges, and external disturbances such as political instability and natural disasters (Chang et al., 2022). Furthermore, global supply chain disruptions, such the COVID-19 pandemic and several geopolitical events, have heightened the need for supply chain adaptability among companies globally (Khan et al., 2024). Bangladeshi SMEs must swiftly respond to such disruptions to maintain operational efficiency and competitiveness (Emon &

Khan, 2023). Thus, understanding the need of supply chain flexibility in developing competitive advantage has become more relevant for SMEs in the country. Supply chain flexibility refers to a company's ability to respond to unexpected variations in supply and demand and to modify its operations to meet the evolving needs of its customers and suppliers (Emon & Khan, 2024; Shukor et al., 2021). It encompasses several dimensions, including supplier adaptability, production adaptability, delivery adaptability, and inventory adaptability. Supplier flexibility refers to a company's ability to rapidly adjust its sourcing strategies and supplier relationships in reaction to variable conditions, such as supply shortages or shifts in demand. Production flexibility refers to the capacity to modify production methods, volumes, and product types in response to fluctuations in market demand. Delivery flexibility refers to the ability to adjust delivery dates, methods, and routes to accommodate customer requirements and overcome logistical challenges. Inventory flexibility refers to an organization's capacity to flexibly modify stock levels, enabling the satisfaction of customer requests without substantial costs or delays (Dubey et al., 2023). Competitive advantage denotes a firm's ability to outpace its competitors by delivering superior products, services, or operational efficiency. Competitive advantage in supply chain management may be achieved by cost leadership, differentiation, or swift reaction to market demands (Kharub et al., 2019). Small and medium-sized firms that effectively use supply chain flexibility are more likely to achieve a competitive advantage, as they can rapidly adjust to changes in consumer preferences, market dynamics, and external disturbances. By improving agility and flexibility, these organizations may reduce lead times, increase customer satisfaction, and optimize resource use, hence strengthening competitiveness (Ralston & Blackhurst, 2020). The relationship between supply chain flexibility and competitive advantage is of significant interest to both scholars and practitioners, particularly concerning SMEs in developing countries. The influence of supply chain flexibility on competitive advantage is particularly relevant in Bangladesh, where SMEs are vital to the economy but face significant operational and competitive challenges (Khan & Emon, 2024). A multitude of SMEs in Bangladesh operate in highly competitive areas, such as textiles, garments, and light manufacturing, where the ability to swiftly adjust to changing market conditions is crucial for success. The country's apparel industry, which represents a significant portion of its exports, has seen increased competition from other low-cost manufacturing countries, such as Vietnam and Cambodia (Das et al., 2024; Emon, 2023). To maintain competitiveness, Bangladeshi garment manufacturers must continually adapt their supply chains to meet the demands of international customers, who often want swift delivery, high-quality products, and cost-effective options. Thus, supply chain flexibility becomes a vital element in ascertaining the ability of these firms to maintain their competitive edge in global markets. Moreover, the need of supply chain flexibility has been underscored by recent global events, such as the COVID-19 pandemic, which disrupted supply networks worldwide and exposed vulnerabilities in traditional supply chain management practices (Moosavi et al., 2022). The epidemic posed significant challenges for Bangladeshi SMEs, as several businesses experienced disruptions in raw material supplies, labor difficulties, and shifts in client demand. Small and medium-sized enterprises that used flexible supply chain practices shown more proficiency in responding to disturbances by promptly adjusting their sourcing strategies, production processes, and delivery methods. In contrast, firms with rigid supply networks struggle to manage disruptions, resulting in delays, increased costs, and reduced competitiveness (Griffin et al., 2019). This highlights the critical role of supply chain flexibility in ensuring business continuity and maintaining a competitive advantage amid crises. In recent years, there has been considerable interest in research concerning supply chain flexibility, with several studies examining its impact on company performance and competitive advantage. Research by Irfan et al. (2019) shown that supply chain flexibility improves operational performance by enabling firms to respond more effectively to market unpredictability. (Juan & Li, 2023) similarly shown that supply chain flexibility enhances competitive advantage by improving a firm's ability to meet customer needs and adapt to changing market conditions. Recent studies have highlighted the importance of supply chain flexibility in mitigating the effects of external shocks, such as natural disasters and global pandemics, on business performance (Delbufalo, 2022). Despite the growing body of literature on supply chain flexibility, research on its specific impact on

competitive advantage inside SMEs in developing nations, particularly in Bangladesh, is limited. While several studies have examined the influence of supply chain management on the competitiveness of Bangladeshi SMEs, few study has focused on the concept of flexibility and its impact on competitive outcomes. This gap in the literature is an opportunity to examine how supply chain flexibility improves the competitive advantage of SMEs in Bangladesh, taking into account the unique challenges and opportunities faced by these businesses. This study seeks to analyze the influence of supply chain flexibility on the competitiveness of Bangladeshi SMEs, acknowledging its importance in achieving competitive advantage. The study explicitly analyzes five essential components of supply chain flexibility: supplier flexibility, production flexibility, delivery flexibility, inventory flexibility, and market responsiveness. The dimensions are evaluated on their impact on competitive advantage, measured by factors such as cost efficiency, customer happiness, market responsiveness, and operational agility. The study aims to clarify how Bangladeshi SMEs may use supply chain flexibility to enhance their competitive position in both local and international markets via an investigation of the relationship between these elements. This research utilizes a quantitative methodology, using a structured questionnaire to collect data from a sample of SMEs in Bangladesh. The questionnaire seeks to collect insights from SME managers and supply chain experts about the adaptability of their supply chain operations and the competitive advantages derived from these practices. The collected data is analyzed using statistical techniques to determine the relationships between the independent variables (aspects of supply chain flexibility) and the dependent variable (competitive advantage). The findings of this research are expected to contribute to the existing literature on supply chain management and competitive advantage, particularly for SMEs in developing countries.

2. Literature Review

The discussion over supply chain flexibility and its impact on competitive advantage has significantly progressed in recent decades. As businesses increasingly recognize the need of agile supply chain management, scholars and practitioners have focused on identifying the components of flexibility that improve competitive performance. Supply chain flexibility is often seen as a multifaceted concept including several aspects of a company's supply chain operations. Research indicates that flexibility in supplier relationships, production processes, delivery schedules, and inventory management may significantly enhance a firm's response to market changes and maintain a competitive edge (Belhadi, Venkatesh, et al., 2024). Historically, supply chain flexibility was mostly regarded in the context of operational efficiency, with enterprises striving to minimize expenses and enhance processes. However, the emergence of dynamic market circumstances characterized by rapid technological advancements and changing consumer needs has expanded the understanding of supply chain flexibility to include a more strategic perspective. Arda et al. (2023) assert that supply chain flexibility improves operational performance and is essential for strategic positioning, enabling organizations to capitalize on new possibilities and effectively navigate challenges. This strategic viewpoint on flexibility aligns with the resource-based view (RBV) of the firm, which posits that unique capabilities, such as supply chain flexibility, may provide sustainable competitive advantage (Ustundağ & Urgan, 2020). Recent studies have shown the importance of certain elements of supply chain flexibility, such as supplier flexibility, manufacturing flexibility, and logistical flexibility, in enhancing competitive advantage. Supplier flexibility refers to a supplier's ability to rapidly adjust to changes in demand or supply conditions (Ramanathan et al., 2021). This factor is particularly significant for SMEs, since they often rely on a limited supplier base and face increased risks associated with supply disruptions. Research demonstrates that organizations fostering collaborative relationships with their suppliers are more proficient in using supplier flexibility, leading to improved performance outcomes (M. Irfan et al., 2019). Furthermore, enhanced supplier flexibility allows organizations to mitigate risks associated with supply shortages and fluctuations in raw material pricing, therefore strengthening the supply chain. Production flexibility, an essential component of supply chain flexibility, refers to a company's ability to adjust its production processes and capacity in reaction to changing demand (Guenther & Guenther, 2021). This aspect of flexibility

is essential for maintaining competitiveness in industries characterized by rapid product life cycles and variable consumer preferences. Studies indicate that firms with high production flexibility may rapidly adjust their operations to align with market demands, hence improving customer satisfaction and retention (Anning-Dorson & Nyamekye, 2020). Furthermore, manufacturing flexibility enables firms to rapidly create and introduce new products, which is crucial for sustaining a competitive advantage in volatile markets. Delivery flexibility, defined as the ability to adjust delivery dates and processes to accommodate customer requirements, has been identified as a vital element in attaining competitive advantage (Shukor et al., 2021). Consumers in the contemporary market increasingly want accelerated delivery times and more flexible shipping options. Organizations capable of fulfilling these requirements via adaptable logistics and distribution strategies are more inclined to enhance customer satisfaction and loyalty. Research indicates that delivery flexibility may enhance a firm's adaptability to market fluctuations and improve its competitive standing (I. Irfan et al., 2022). Inventory flexibility, reflecting a firm's ability to adeptly manage inventory levels, is a crucial component of supply chain flexibility. This element is particularly relevant for SMEs, who often operate with limited resources and must balance inventory costs with service quality. Studies demonstrate that organizations using flexible inventory management techniques, such as just-in-time (JIT) systems and demand-driven replenishment, may more effectively adapt to demand variations and reduce the risks of overstocking or stockouts (Tian et al., 2023). Consequently, inventory flexibility may improve operational efficiency and customer happiness, thus reinforcing competitive advantage. The relationship between supply chain flexibility and competitive advantage has been thoroughly investigated via empirical research. A meta-analysis by El-Khalil & Mezher (2020) reveals a positive correlation between supply chain flexibility and many performance metrics, including operational performance, customer happiness, and overall organizational success. The authors assert that enterprises using flexible supply chain techniques are better positioned to manage market unpredictability, therefore gaining a competitive edge. Research by Gligor et al. (2019) indicates that supply chain flexibility is positively associated with a firm's ability to innovate, adapt to changes, and meet customer demands, hence underscoring its importance in achieving competitive advantage. The research delineates specific challenges and opportunities influencing the relationship between supply chain flexibility and competitive advantage in Bangladeshi SMEs. Small and medium-sized firms in Bangladesh often have resource constraints, limited technological access, and inadequate infrastructure, which may hinder their ability to effectively implement flexible supply chain strategies (Benzidia & Makaoui, 2020). Despite these challenges, Bangladeshi SMEs possess unique benefits, such as strong collaborations with local suppliers and a deep comprehension of domestic market dynamics, which may improve supply chain flexibility. Research suggests that SMEs using these advantages to create flexible supply chains might improve their competitiveness in both local and international markets (Belhadi, Kamble, et al., 2024). The impact of external factors on supply chain flexibility and competitive advantage in Bangladeshi SMEs is substantial. Recent global events, like as the COVID-19 pandemic, have shown the vulnerabilities of supply chains worldwide and underscored the need of adaptation for maintaining business continuity (Seuring et al., 2022). Many SMEs in Bangladesh had significant challenges during the pandemic, particularly in sourcing raw supplies and fulfilling customer orders. Entities who previously used flexible supply chain strategies were more proficient in addressing the challenges posed by the crisis, highlighting the critical role of supply chain flexibility in sustaining resilience and competitiveness (Belhadi, Kamble, et al., 2024). The rapidly changing technological landscape, coupled with external disruptions, presents challenges and opportunities for Bangladeshi SMEs in terms of supply chain flexibility. The advent of digital technologies, such as artificial intelligence (AI), the Internet of Things (IoT), and big data analytics, has the potential to enhance supply chain visibility and responsiveness (Dubey et al., 2022). Nonetheless, several SMEs in Bangladesh encounter obstacles in implementing these technologies due to financial constraints and inadequate technical expertise. Research indicates that SMEs using digital technologies to enhance supply chain flexibility are more likely to get a competitive advantage in the market (Iranmanesh et al., 2023). Furthermore, the impact of government policies and support mechanisms on improving supply chain flexibility in Bangladeshi SMEs need further examination.

Government initiatives aimed at augmenting infrastructure, facilitating access to funding, and promoting technology adoption may significantly impact the ability of SMEs to develop flexible supply chains (Dey et al., 2024). Research suggests that certain governmental measures may foster supply chain flexibility, enabling SMEs to enhance their competitive position and contribute to economic growth (Machado et al., 2020). Notwithstanding the growing body of research on supply chain flexibility and competitive advantage, many gaps and limitations need attention. The majority of contemporary research has focused on large corporations, with little empirical studies examining the distinct context of SMEs, particularly in developing countries. Furthermore, while several elements of supply chain flexibility have been acknowledged, the interplay among these dimensions and their collective impact on competitive advantage remains little explored. Additional research is necessary to have a comprehensive knowledge of the relationships among different components of supply chain flexibility and their influence on overall performance in SMEs. The literature underscores the crucial importance of supply chain flexibility in enhancing competitive advantage, particularly for SMEs in dynamic and challenging environments. Key elements of supply chain flexibility, including supplier flexibility, manufacturing flexibility, delivery flexibility, and inventory flexibility, have shown a beneficial effect on a firm's ability to respond to market changes and achieve outstanding performance outcomes. The relationship between supply chain flexibility and competitive advantage in Bangladeshi SMEs is affected by several variables, including as resource constraints, technical advancements, external disturbances, and governmental support. As the global business landscape transforms, understanding the importance of supply chain flexibility in bolstering competitiveness will be essential for SMEs striving to thrive in more competitive markets. Future research should examine the specific dynamics of supply chain flexibility in SMEs in developing nations, addressing existing literature gaps and providing practical insights for practitioners and policymakers.

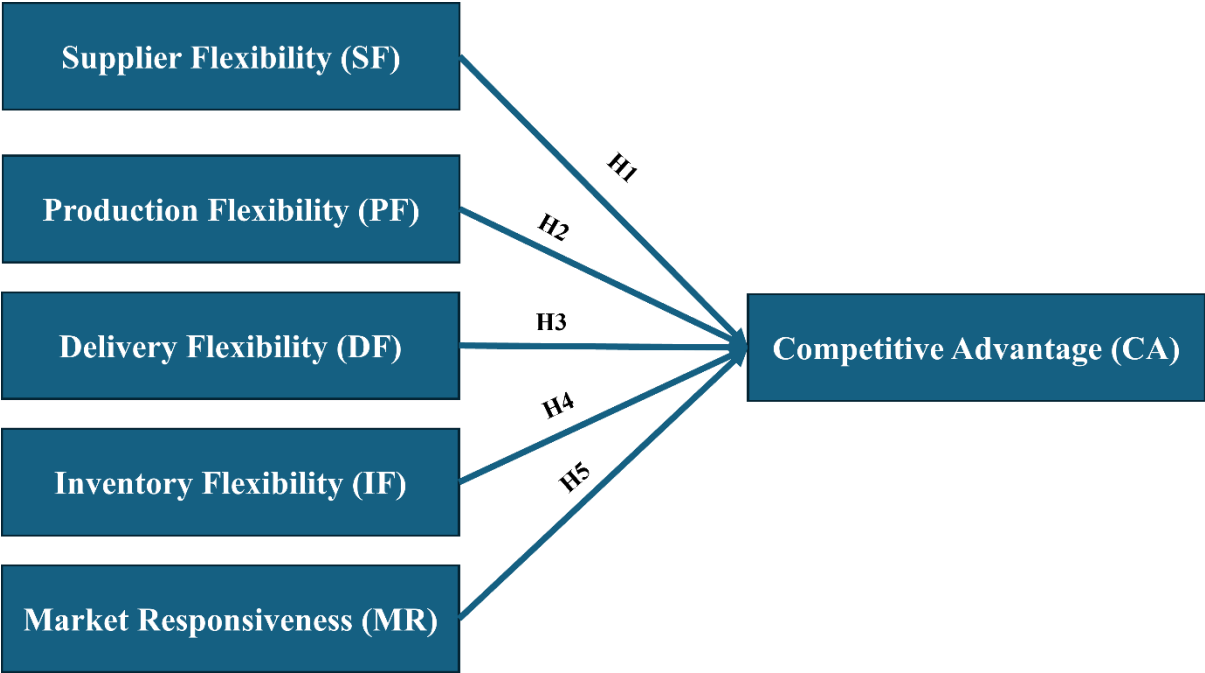


Figure 1. Research Framework.

3. Research Methodology

This research used a quantitative methodology to analyze the influence of supply chain flexibility on competitive advantage in Bangladeshi SMEs. A comprehensive questionnaire was developed to collect data from SMEs in various sectors in Bangladesh. The survey instrument included questions on aspects of supply chain flexibility, such as supplier flexibility, production flexibility, delivery flexibility, and inventory flexibility, along with queries about the perceived

competitive advantage of the firms. The sample size was determined to be 250 respondents, deemed enough for the planned statistical analyses of this research. Participants were chosen using a non-probability selection method, namely purposive sampling, to ensure that respondents had relevant knowledge in supply chain management and occupied decision-making roles within their organizations. The surveys were distributed using email and social media platforms, facilitating wider accessibility across diverse geographical areas in Bangladesh. Data collecting transpired during a three-month period, during which follow-up reminders were sent to non-respondents to enhance the response rate. After concluding the data collection phase, the responses were compiled and examined using the Statistical Package for the Social Sciences (SPSS) program. The collected data underwent many preprocessing methods, including data cleaning to remove incomplete responses and to evaluate the validity and reliability of the questionnaire. The study used descriptive statistics to summarize the demographic characteristics of the participants and inferential statistics to examine the relationships between supply chain flexibility and competitive advantage. Correlation analysis was performed to determine the extent and direction of the relationships between various attributes of supply chain flexibility and overall competitive advantage. Furthermore, regression analysis was conducted to assess the predictive ability of supply chain flexibility on competitive advantage, enabling the identification of the most significant factors influencing competitive results for Bangladeshi SMEs. To uphold the study's rigor, the research adhered to ethical standards by obtaining informed consent from participants and ensuring the confidentiality of their responses. This quantitative research sought to better the knowledge of supply chain management in SMEs, particularly in developing countries like Bangladesh, and to provide actionable insights for practitioners aiming to bolster their competitive advantage via improved supply chain practices. The research aimed to highlight the significance of supply chain flexibility as a strategic asset for SMEs, enabling them to manage the complexities of the modern business landscape.

4. Results

4.1. Reliability Statistics

The reliability statistics in Table 1 indicate a Cronbach's Alpha score of 0.902, indicating that the instrument used in this study has strong internal consistency. Cronbach's Alpha is a widely used statistic for assessing the reliability of a set of items or questions in a questionnaire. A Cronbach's Alpha score over 0.9 indicates a considerable degree of reliability, indicating that the items evaluate a unified underlying construct (Emon et al., 2024). The questionnaire, consisting of 20 questions, produced a Cronbach's Alpha of 0.904 for standardized items, indicating strong internal consistency. The similarity between the two outcomes suggests that the reliability of the items persists irrespective of standardization, hence confirming the measuring tool's robustness. This level of reliability is essential for ensuring that the collected data accurately reflects the constructs being evaluated—in this instance, the dimensions of supply chain flexibility and their influence on competitive advantage. The increased reliability indicates that the questionnaire items are expected to provide similar responses across different samples, hence enhancing the validity of the research findings. When assessing complex systems like supply chain flexibility, a reliable evaluation technique is crucial for drawing valid findings on their impact 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

The descriptive statistics in Table 2 provide valuable insights into respondents' evaluations on supply chain flexibility and its influence on competitive advantage within Bangladeshi SMEs. Each question was evaluated using a 5-point Likert scale, where a higher mean score indicated more agreement with the statement. The statement "Our logistics team can quickly change delivery routes to overcome transport issues" had the highest mean score (Mean = 4.36, SD = .759), suggesting that respondents generally see their logistics teams as highly adaptive and skilled in resolving transport challenges. The significant flexibility in logistics indicates a prominent advantage in the supply chain operations of the analyzed SMEs. Consequently, factors related to delivery flexibility, including "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), received high mean scores. These responses indicate that adaptability in sourcing and delivery is well-established, allowing companies to efficiently manage supplier relationships and customer deliveries, which are critical components of a responsive supply chain. Further dimensions of supply chain flexibility, such as the ability to adjust production processes ("Our production processes allow for modifications in product specifications with minimal downtime," Mean = 3.98, SD = .986) and adaptability in inventory management ("We can promptly modify inventory levels to avert stockouts or overstocking," Mean = 4.01, SD = 1.045), received relatively high assessments. The results demonstrate that most SMEs in the sample possess the capability to effectively handle changes in production and inventory, hence improving overall supply chain agility. 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) suggest that respondents largely agree that supply chain flexibility enhances their businesses' competitive advantage. Nevertheless, the comparatively lower averages for other supply chain flexibility characteristics suggest that, while SMEs recognize the need of flexibility, there is room for improvement in using this flexibility to consistently outpace competitors. The standard deviations across items are minimal, indicating that responses were mostly uniform throughout the sample. Items with high standard deviations, such as "We can quickly adjust our production output to meet sudden changes in customer demand" (SD = .932), indicate more variability in the beliefs of different firms about their flexibility in certain areas. This variability may indicate that although some firms have strong procedures, others may struggle to maintain 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 clarifies the linkages among several aspects of supply chain flexibility (supplier flexibility, manufacturing flexibility, delivery flexibility, inventory flexibility, and market responsiveness) and their impact on competitive advantage in Bangladeshi SMEs. The matrix presents Pearson correlation coefficients that indicate the strength and direction of relationships among the variables, along with significance levels (p-values) to assess the statistical significance of the correlations. Supplier flexibility has strong positive correlations with several indicators 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 suggests that SMEs exhibiting more supplier flexibility are likely to have improved production, delivery, and inventory adaptability. The strong correlation with production flexibility indicates that sourcing flexibility is closely connected to the ability to alter production methods, hence enabling swift adjustments to meet market demands. Production flexibility is significantly correlated with delivery flexibility ($r = 0.633$, $p < 0.001$) and inventory flexibility ($r = 0.608$, $p < 0.001$). Numerous findings indicate that firms proficient in rapidly adjusting their production capacity may also optimize their logistics and inventory management, highlighting the interconnectedness of different supply chain components. Moreover, production flexibility has a slight correlation with competitive advantage ($r = 0.188$, $p = 0.003$), suggesting that firms adept at manufacturing varied products or rapidly adjusting may get a competitive edge in their market. Delivery flexibility has a substantial association with inventory flexibility ($r = 0.682$, $p < 0.001$) and competitive advantage ($r = 0.143$, $p = 0.024$). This suggests that firms proficient in managing their delivery schedules and processes are likely to maintain flexible inventory systems, which are crucial for ensuring customer satisfaction and timely order fulfillment. The correlation with competitive advantage, however less significant than other factors, indicates that effective delivery strategies improve a firm's overall competitive position. Inventory flexibility is significantly correlated with competitive advantage ($r = 0.133$, $p = 0.035$), highlighting that the ability to adeptly

manage inventory levels—adjusting stock in accordance with demand fluctuations—can improve competitive performance. Nonetheless, it has a diminished correlation with other dimensions of flexibility as compared to supplier and production flexibility. Market Responsiveness has a positive correlation with competitive advantage ($r = 0.460$, $p < 0.001$). This indicates that firms that adjust to market fluctuations and trends are more likely to achieve competitive advantages. The correlation with supply chain flexibility dimensions, however small (e.g., $r = 0.190$ with supplier flexibility and $r = 0.130$ with production flexibility), suggests that market responsiveness is crucial but also shaped by the overall flexibility of the supply chain. The most significant correlation in the matrix is between supplier flexibility and production flexibility, indicating that enhancing supplier relationships may directly influence production adaptability. The results highlight the importance of interconnected flexibility attributes in achieving competitive advantage among Bangladeshi SMEs. Organizations that prioritize and enhance their flexibility across the whole supply chain are more inclined to respond effectively to market demands, therefore positioning themselves favorably against competitors.

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 presents the model summary for the regression analysis evaluating the influence of supply chain flexibility dimensions—specifically market responsiveness, inventory flexibility, supplier flexibility, delivery flexibility, and production flexibility—on competitive advantage in Bangladeshi SMEs. An R value of 0.486 indicates a moderate positive correlation between the independent variables (several indicators of supply chain flexibility) and the dependent variable (competitive advantage). This suggests that an augmentation in supply chain flexibility dimensions is associated with an improvement in competitive advantage. An R Square (R²) score of 0.236 indicates that about 23.6% of the variability in competitive advantage is explained by the five dimensions of supply chain flexibility used in the model. Our figure represents a significant portion of the variance, although it suggests the presence of other factors not examined in our study that might influence competitive advantage in Bangladeshi SMEs. The Adjusted R Square score of 0.220 provides a more accurate evaluation by accounting for the number of predictors in the model. It suggests that, even when considering the number of independent variables, more than 22% of the variability in competitive advantage may still be ascribed to the aspects of supply chain flexibility. The little reduction in the R² value indicates that the model maintains an adequate fit despite the inclusion of several variables. The Standard Error of the Estimate is 0.80036, signifying the average departure of the observed data from the regression line. A decreased standard error indicates an improved model fit to the data, whereas an elevated standard error suggests more variability in the predictions. A standard error of 0.80036 indicates a level of prediction inaccuracy, although it is within a range that suggests the model is proficient in clarifying 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 displays the ANOVA (Analysis of Variance) results for the regression model investigating the impact of supply chain flexibility dimensions—market responsiveness, inventory flexibility, supplier flexibility, delivery flexibility, and production flexibility—on competitive advantage within Bangladeshi SMEs. The Sum of Squares for the Regression is 48.255, indicating the variance in the dependent variable (competitive advantage) that can be elucidated by the independent variables used in the model. The Residual Sum of Squares is 156.301, indicating the variance unexplained by the model. The Total Sum of Squares is the aggregate of the regression and residual sums of squares, totaling 204.556. The degrees of freedom (df) for the regression model is 5, corresponding to the number of predictors, but the degrees of freedom for the residual is 244, calculated as the total observations minus the number of predictors minus one. This yields a cumulative total of 249 degrees of freedom. The Mean Square values are determined by dividing the total of squares by the corresponding degrees of freedom. The Mean Square for Regression is computed as 48.255 divided by 5, yielding 9.651, whereas the Mean Square for Residual is about 156.301 divided by 244, resulting in around 0.641. The F-statistic is calculated by dividing the Mean Square for Regression by the Mean Square for Residual, yielding 9.651 / 0.641 = 15.066. The F-statistic

evaluates the overall significance of the regression model, determining whether the independent variables substantially account for the variability in the dependent variable. The significance (p-value) corresponding to the F-statistic is stated as 0.000. This number is below the standard significance threshold of 0.05, indicating a statistically significant correlation between the independent variables and competitive advantage. This indicates that at least one predictor (dimensions of supply chain flexibility) significantly influences competitive advantage, hence demonstrating that supply chain flexibility is a crucial element in augmenting 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 presents the coefficients obtained from the regression analysis investigating the impact 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 indicates that when all independent variables are zero, the expected competitive advantage is 0.523; nevertheless, this finding is not statistically significant ($p = 0.257$). Supplier Flexibility shows a coefficient of 0.254 ($p = 0.142$), reflecting a positive correlation with competitive advantage that is not statistically significant, while Production Flexibility reveals an insignificant effect (coefficient = 0.006, $p = 0.963$), indicating it does not meaningfully influence competitive advantage. The coefficient for Delivery Flexibility is -0.111 ($p = 0.418$), suggesting that enhanced delivery flexibility may be associated with a decrease in competitive advantage; nevertheless, this result lacks statistical significance. The coefficient for Inventory Flexibility is 0.070 ($p = 0.506$), indicating a lack of significant impact on competitive advantage. In contrast, Market Responsiveness demonstrates a strong and statistically significant association, with a coefficient of 0.593 ($p = 0.000$), suggesting that increased market responsiveness is associated with a substantial improvement in competitive advantage, hence positioning it as a crucial predictor. The study reveals that, although dimensions of supply chain flexibility have some impact, only market responsiveness significantly enhances competitive advantage, highlighting the need for Bangladeshi SMEs to adjust to market volatility and consumer demands.

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 analysis of supply chain flexibility's influence on competitive advantage in Bangladeshi SMEs reveals some critical discoveries that deepen our understanding of the sector's dynamics. The

results indicate that, among the supply chain flexibility aspects examined, only market responsiveness was recognized as a statistically significant predictor of competitive advantage. This signifies that for SMEs in Bangladesh, the ability to rapidly adjust to market demands and variations is essential for attaining a competitive edge. In the contemporary corporate environment, characterized by fluctuating consumer preferences and economic instability, the capacity for rapid response may distinguish successful enterprises from their competitors. The positive association between market responsiveness and competitive advantage underscores the need for SMEs to enhance their responsiveness strategies. Organizations that can swiftly modify their operations, product offerings, and marketing tactics to meet customer demands are better positioned to capitalize on market possibilities and mitigate potential risks. This finding aligns with contemporary studies emphasizing the critical role of responsiveness in achieving superior performance in volatile markets (Kumar et al., 2020; Li et al., 2022). It advises that SMEs in Bangladesh focus on investing in systems and processes that provide real-time market analysis, customer feedback mechanisms, and swift decision-making. In contrast, the other attributes of supply chain flexibility—supplier flexibility, production flexibility, delivery flexibility, and inventory flexibility—did not demonstrate statistically significant associations with competitive advantage. The little impact of supplier flexibility indicates that, while adaptable suppliers are beneficial, they do not provide an instant competitive advantage for SMEs in the current context. This may stem from several factors, including the nature of supplier relationships in Bangladesh, where long-term cooperation are less common than in larger enterprises or more mature markets. Furthermore, the influence of production and delivery flexibility may be overshadowed by other operational challenges faced by SMEs, such as resource constraints, infrastructural restrictions, and issues related to market accessibility. The observed negative association between delivery flexibility and competitive advantage raises critical questions about operational strategy inside SMEs. It may suggest that more delivery flexibility, frequently associated with higher costs and complexity, may not always lead to a better competitive position. Small and medium-sized firms must integrate flexibility with efficiency, ensuring that delivery capabilities align with actual market demands rather than only emphasizing flexibility as a single goal. Moreover, the findings highlight the need of inventory flexibility, notwithstanding a lack of meaningful association. Modifying inventory levels in response to market demands is essential, especially in a fluctuating market like Bangladesh. However, the results indicate that having flexible inventory management systems alone is insufficient for achieving a competitive advantage. Small and medium-sized firms should integrate inventory management into holistic supply chain strategies that involve forecasting, demand planning, and supplier coordination. In light of these findings, it is imperative for policymakers and industry stakeholders in Bangladesh to foster a climate that enhances market responsiveness and supply chain agility. This may include providing training and resources for SMEs to adopt modern technologies, such as data analytics and artificial intelligence, which might improve their capacity to evaluate market trends and consumer behavior more effectively. Furthermore, fostering collaboration between SMEs and larger firms or industry networks may enhance information sharing and resource consolidation, hence increasing overall supply chain capabilities. This study highlights the importance of market responsiveness as a crucial element for competitive advantage in Bangladeshi SMEs, while also raising critical questions about the roles of other aspects of supply chain flexibility. The results of this research may inform management strategies and governmental initiatives aimed at improving the competitiveness of SMEs in Bangladesh. Future research may explore the underlying reasons of the observed correlations, examine sector-specific complexities, and evaluate the impact of external factors, such as economic conditions and technology advancements, on supply chain flexibility and competitive advantage.

6. Conclusions

This research emphasizes the vital role of supply chain flexibility in establishing competitive advantage for Bangladeshi SMEs. The findings underscore the vital importance of market responsiveness as a key factor that directly affects competitive positioning. In a swiftly changing and competitive environment, the ability of SMEs to quickly adapt to shifting market conditions,

consumer preferences, and emerging opportunities is essential for achieving and maintaining a competitive edge. The significant correlation between market responsiveness and competitive advantage suggests that SMEs must prioritize the development of agile supply chain strategies that enable swift modifications in their operations and goods. The research revealed that several dimensions of supply chain flexibility, such as supplier flexibility, manufacturing flexibility, delivery flexibility, and inventory flexibility, did not exhibit statistically significant connections with competitive advantage in Bangladeshi SMEs. This underscores important ramifications for the operational strategies used by these companies and indicates the need for an advanced understanding of how various elements of flexibility interconnect and influence overall performance. The identified negative association between delivery flexibility and competitive advantage suggests that just improving delivery flexibility may be insufficient and might lead to inefficiencies that detract from competitiveness. The implications of these results are twofold. Initially, SMEs must emphasize enhancing their market responsiveness by investing in technology and processes that provide real-time market analysis and customer engagement. Implementing data-driven decision-making and fostering a culture of agility will empower SMEs to adjust effectively to market fluctuations and seize new opportunities. Secondly, industry stakeholders and policymakers must work to create an environment that enables SMEs to develop flexible and responsive supply chains. This entails providing access to training, resources, and technology that may enhance supply chain capabilities. This study emphasizes that, while supply chain flexibility is vital for competitive advantage, market responsiveness is essential for Bangladeshi SMEs. This research advances the comprehension of supply chain management by pinpointing the specific factors that cultivate competitive advantage in this unique context. Future research may concentrate on investigating the interaction between different elements of supply chain flexibility and evaluating the impact of external factors on the supply chain dynamics of SMEs in Bangladesh. By using the insights from this study, SMEs may improve their standing for sustainable growth and competitiveness in a fluctuating economy.

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