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Research Paper

Study of the Impact of Supply Chain Sustainability Dimensions on Sustainable Competitive Advantage with the Mediating Role of Production Flexibility and Strategic Flexibility (Case Study: Dairy Industry of Fars Province)

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Abstract

In today's competitive markets, organizations must possess a high level of adaptability to gain a competitive edge. To explore the impact of a sustainable supply chain on sustainable competitive advantage, this study examined strategic flexibility and flexibility-productivity as mediating variables. The research focused specifically on the dairy industry in Fars province and involves industry experts from the domestic sector, selected through judgment sampling. Data was collected via a questionnaire, and Structural Equation Modeling (SEM) was employed for analysis. The findings of the study indicated that the economic, environmental, and social dimensions of supply chain sustainability have a significant influence on product flexibility. Additionally, these dimensions have a notable impact on strategic flexibility, except for the social dimension's effect on production flexibility. Furthermore, both production and strategic flexibility positively and significantly contribute to the achievement of sustainable competitive advantage. In conclusion, this research highlighted the importance of a sustainable supply chain in attaining sustainable competitive advantage. The economic, environmental, and social dimensions play a crucial role in enhancing both product and strategic flexibility. By embracing sustainable practices and fostering flexibility in production and strategy, organizations in the dairy industry can maintain a competitive advantage over time.

Keywords

Sustainable Supply Chain, Productivity Flexibility, Strategic Flexibility, Sustainable Competitive Advantage

1. Introduction

In recent years, the sustainability crisis has gained considerable attention from governments and businesses alike. Sustainable development, as defined by the World Commission on Environment and Sustainable Development, refers to the ability to meet present needs without compromising the

ability of future generations to meet their own needs [1]. At the organizational level, sustainable development encompasses various concepts such as sustainable management, corporate sustainability, sustainable innovation, sustainable entrepreneurship, social business, and sustainable competitive advantage. Sustainable management involves an organization's approach to addressing social, environmental, and economic issues and implementing strategies to achieve sustainable development across the economy, society, and ecosystem [2].

The food supply chain is a vast and intricate sector globally, with ensuring food safety and quality consistently being a top priority [3]. Dairy products encompass a range of goods produced from milk. Within the dairy industry, various methods are employed to extend the shelf life of milk and other dairy products, enabling them to be consumed over an extended period. Dairy has become a crucial part of people's daily diets, with calcium's importance leading to numerous recommendations for its consumption. As a result, the dairy market has experienced rapid growth due to factors such as increasing world population, rising income levels, growing disposable income, and heightened consumer focus on food health, increasing the market value of dairy products [4].

Short-term perishable food products, particularly dairy products, undergo a gradual decline in quality throughout the supply chain, unlike non-perishable items. Consequently, managing the different types of products within dairy supply chain networks is a complex undertaking. One primary objective of distributing perishable goods, specifically within the dairy supply chain, is to ensure timely delivery to customers, directly impacting supply chain responsiveness. For perishable goods, greater emphasis is placed on product quality, minimizing delivery time, or maximizing product quality upon arrival [5-6].

On the other hand, the dairy supply chain often deals with a high volume of raw materials, presenting an opportunity for time-saving in transportation and coordination to become a significant competitive advantage in meeting evolving customer needs. Organizations are expected to deliver products and services with high standards, speed, and flexibility. Meeting customer satisfaction in terms of product quality and order fulfillment time is a concern for producers and distributors of perishable goods, particularly in the dairy industry due to the high demand for dairy products and their impact on human health. Flexibility is a critical approach to managing environmental uncertainty. Organizational flexibility refers to a company's dynamic ability to proactively respond to changes in the competitive environment, which can lead to a sustainable competitive advantage. Organizations require flexibility and adaptability to navigate environmental uncertainties [7-8].

Efficient management of the supply chain, especially for perishable goods like food products, is of utmost importance. Increasing profitability is a key objective for any industry, and achieving consistency and fast movement within a supply chain is a critical requirement for food supply chains [9]. Innovation in green products not only improves sustainability but also enhances producers' competitive advantage. Similarly, sustainable supply chain management can enhance the environmental and economic performance of organizations, promoting sustainability as a goal [10]. Organizations adopt sustainable development strategies to respond to rapid global changes, global competition, regulatory constraints, and the preferences of customers and stakeholders. Redesigning supply chain networks based on sustainability principles plays a vital role in supply chain flexibility, ensuring long-term profitability for firms [11].

Implementing green supply chain management practices can improve a company's ecological commitment and competitiveness by reducing environmental risks and impacts. By integrating management practices throughout the supply chain, companies can establish a sustainable supply chain that provides a competitive advantage. Companies can improve their environmental footprint by implementing innovative sustainable and green practices across the entire supply chain, from production to delivery. Many researchers emphasize the importance of flexibility in influencing overall sustainability performance. Therefore, supply chain sustainability and organizational flexibility are significantly correlated, with organizational flexibility being a crucial factor in achieving a sustainable supply chain and competitive advantage. Flexibility presents a fundamental challenge for managers today to maintain competitiveness in a volatile business environment. Given the dairy industry's significant position, this research aims to evaluate the impact of supply chain sustainability on the competitive advantage of sustainability, which is a vital concern for senior managers in the dairy industry. This evaluation takes into account the variables of production flexibility and strategy [3].

1.1 Theoretical foundations of research

- *Sustainable supply chain*

A sustainable supply chain refers to the enhancement of the long-term performance of a supply chain by addressing social, economic, and environmental issues commonly associated with traditional supply chains. The concept of sustainable development emerged from global environmental and development societies. The focus of a sustainable supply chain lies in the simultaneous consideration of environmental and social concerns alongside the economic function of network organizations [12]. The implementation of sustainable supply chain management within organizations introduces competitive interests. Organizations are responsible for preserving and promoting environmental, social, and economic interests, which in turn promotes sustainability. Embracing a sustainability approach also leads to improvements and advancements in organizational performance. In the context of the supply chain, sustainability involves aligning the supply chain to account for social factors (such as competitive criteria), economic factors (cost and profitability), and environmental factors (such as waste emissions) while addressing the challenges commonly found in traditional supply chains [13-14].

- *Competitive advantage*

In recent years, discussions surrounding business strategies have frequently centered around the concept of competitive advantage. While competitive advantage is widely recognized as a fundamental concept in strategic and operational management, there is no precise definition or operational framework for it. Research suggests that managers should not solely rely on their resources to determine competitive advantage but should also consider superior performance [15-16]. The concept of competitive advantage is directly tied to the desired values of customers. In other words, when an organization's offered values closely align with customers' desired values across various criteria, it can be said that the organization possesses superiority and advantage. Therefore, to achieve sustainable competitive advantage, an organization must take into account both its external environment and its internal capabilities [17].

Creating and maintaining the sustainability of competitive advantage requires specific competencies that generate value for customers. Sustainable competitive advantage refers to those advantages that are valuable to customers due to the organization's unique strengths, are challenging for competitors to imitate or replicate, and contribute to the organization's high performance and competitiveness [18-19].

- *Production flexibility*

In the current dynamic and competitive global market, the capacity to create comparative advantage and competitive advantage holds significant value. It is crucial to employ enhanced and adaptable systems in both products and production processes. This necessitates continuous attention to quality and customer requirements. In other words, organizations must prioritize improvement, innovation, and the establishment of production flexibility, as these strategic shifts have become ingrained values within the industry [7].

Production flexibility pertains to an organization's ability to broaden the range of its existing products, enhance responsiveness to rapid changes, and achieve high performance by manufacturing a diverse array of goods. Flexible production empowers companies to produce a wide variety of products. Additionally, a flexible production process facilitates swift design modifications and fosters innovation within the organization. By tailoring products to meet market needs and preferences, companies can effectively respond to competitors and fluctuations in customer demand. Consequently, organizations can achieve sustainable competitive advantage by enhancing their capabilities for flexibility.

- *Strategic flexibility*

In a stable business environment, traditional management approaches have proven effective in facilitating organizational success. However, these approaches have limitations in preparing organizations to navigate environmental uncertainties. As a result, management theories highlight the significance of organizational strategic flexibility as an alternative to traditional management. Strategic flexibility denotes a company's capability to adapt and respond effectively to significant environmental changes. When companies successfully integrate strategic flexibility, it often leads to enhanced performance and creates difficulties for competitors attempting to replicate their success. Consequently, decision-makers increasingly recognize the importance of strategic flexibility [10-2].

Strategic flexibility encompasses both internal restructuring within a company and the revitalization of its external relationships. With this definition, strategic flexibility addresses both the internal dynamics and the external circumstances of an organization [21]. It involves the ability to swiftly respond to market opportunities, explore technological advancements through the development of new products, provide versatile production lines, and rapidly enhance existing products. In the current competitive business environment, organizations must outpace their competitors to thrive amidst rapid market changes [22].

2. Literature review

Table 1. Research Background

Research Findings	Research Topic	Release Year	Authors
Customer pressure and company innovativeness factors affect sustainable supply chain management activities and the also, and sustainable supply chain management activities lead to creating a sustainable competitive advantage for organizations	The role of sustainable supply chain management methods in creating sustainable competitive advantage	2017	Ebrahim pour Azbari [23]
There is a significant and positive relationship between strategic flexibility and the Pegah Fars' supply chain performance, as well as a significant relationship between strategic flexibility and the Pegah Fars' supply chain performance.	Identifying and Prioritizing Supply Chain Sustainability Indicators for Perishable Products Via Grounded Theory and Fuzzy Hierarchical Analysis Approach	2021	Heidari et al. [3]
Strategic flexibility also affects every aspect of a firm's performance, including financial performance and market performance.	The effect of strategic flexibility on firm performance	2017	Chen et al.[29]
Environmental management practices only lead to sustainable competitive advantage when it is in line with the company's economic performance, and there is a direct and significant relationship between social and economic performance and sustainable competitive advantage.	The effect of sustainable supply chain management practices on gaining sustainable competitive advantage	2018	Das [24]
Dairy production behavior, ethical behavior on livestock, government regulation, and corporate social responsibility affect the quality of dairy product reliability and consequently, affect competitive advantage.	Determining the determinants of competitive advantage, the sustainable supply chain in the dairy industry	2018	Ding et al. [25]
There is a significant and positive relationship between production flexibility and performance, therefore, all kinds of flexibility in production lead to sustainable growth and improvement in corporate performance.	Investigating the effect of production flexibility and corporate performance (economic, environmental, and social)	2017	Kumar et al.[26]
There is a positive relationship between production flexibility and strategic flexibility and supply chain agility and the positive role of supply chain agility on production flexibility and strategic flexibility and achieving sustainable competitive advantage and enhancing corporate performance.	Effect of production flexibility and strategic flexibility and supply chain agility on corporate performance	2017	Chan et al. [7]
Based on the results, the strategy of resource allocation and production is one of the most important capabilities of an organization in achieving sustainable competitive advantage in a business environment.	Investigation production flexibility to achieve sustainable competitive advantage	2015	Abdul Malek et al. [17]
Strategic flexibility has a positive effect on business performance by achieving sustainable competitive advantage	The role of strategic flexibility in achieving sustainable competitive advantage and its effect on business performance	2015	Eryesil, Esmen, and Beduk [27]

There is a positive relationship between strategic intelligence and strategic flexibility as well as strategic intelligence and achieving the sustainable competitive advantage.	Investigation of strategic intelligence and its dimensions, and strategic flexibility and its dimensions (flexibility of marketing and competitive production) and achieving sustainable competitive advantage	2021	Agha et al.[21]
Production and strategy flexibility, as well as attention to technology dimensions in production, lead to increased productivity and improved operations, and meet the expectations of the supply chain.	Investigation of production and strategy flexibility and technological dimensions on supply chain performance	2013	Kim et al.[28]

2.1 Data collection method and analysis

The current study is an applied research investigation conducted with a descriptive survey design to collect data. Questionnaires and interviews were the primary data collection tools employed. To identify the factors influencing supply chain sustainability, the researchers initially identified the key characteristics and criteria of supply chain sustainability through literature reviews. Subsequently, in-depth interviews were conducted with 15 experts who possessed experience in the dairy industry. Notably, the selection of these experts was based on a judgmental sampling method. As a result, the research questionnaire was developed by drawing upon the conceptual model derived from previous studies, expert opinions, and relevant literature to ensure its validity.

The conceptual model of the questionnaire encompassed three dimensions of sustainability: environmental, social, and economic. The economic factors included economic performance, supply procedures, vulnerability, investment, product safety and quality, and market presence. The environmental factors covered green production, green logistics, green design, and green strategy, with specific criteria such as materials and energy, water, atmosphere, biodiversity, and animal welfare. The social dimension encompassed employees, customers, and society, with criteria such as employment, safety and health, education, equal opportunity, non-discrimination, consumer labeling, safety and health, marketing communications, adherence to community standards and laws, anti-competitive behavior, and combating official corruption.

A total of 22 indicators were identified for the economic dimension, 22 indicators for the environmental dimension, and 40 indicators for the social dimension, which served as the foundation of the questionnaire. The questionnaire consisted of 108 measurement questions, encompassing economic, social, and environmental dimensions, as well as production flexibility, strategic flexibility, and sustainable competitive advantage.

The collected questionnaire data was analyzed using structural equation modeling with the partial least squares approach (PLS-SEM), following Kline's methodology (2010). The target population of the study consisted of internal specialists from dairy companies operating in the Fars Province. The companies were selected based on their superior environmental management systems and more sustainable supply chains compared to other companies in the industry. The selected dairy companies in the Fars Province included Pegah, Ramak, Manimas, Daity, Shandiz, and Arjan. The final sample for the research included four companies: Pegah, Ramak, Manimas, and Daity.

3. Data Analysis and Findings

Descriptive statistics of the data extracted from these questionnaires are shown in the table below.

Table 2. Descriptive analysis of research data

Demographic features		Frequency	Relative frequency (%)
Sex	Female	19	19.8
	Male	81	80.2
Education	Bachelor's degree	35	34.6
	Master's degree	55	54.5
	Ph.D.	10	9.9
Service History	5-10	33	33
	11-15	47	47
	16-20	20	20

3.1 Conceptual Model of Research

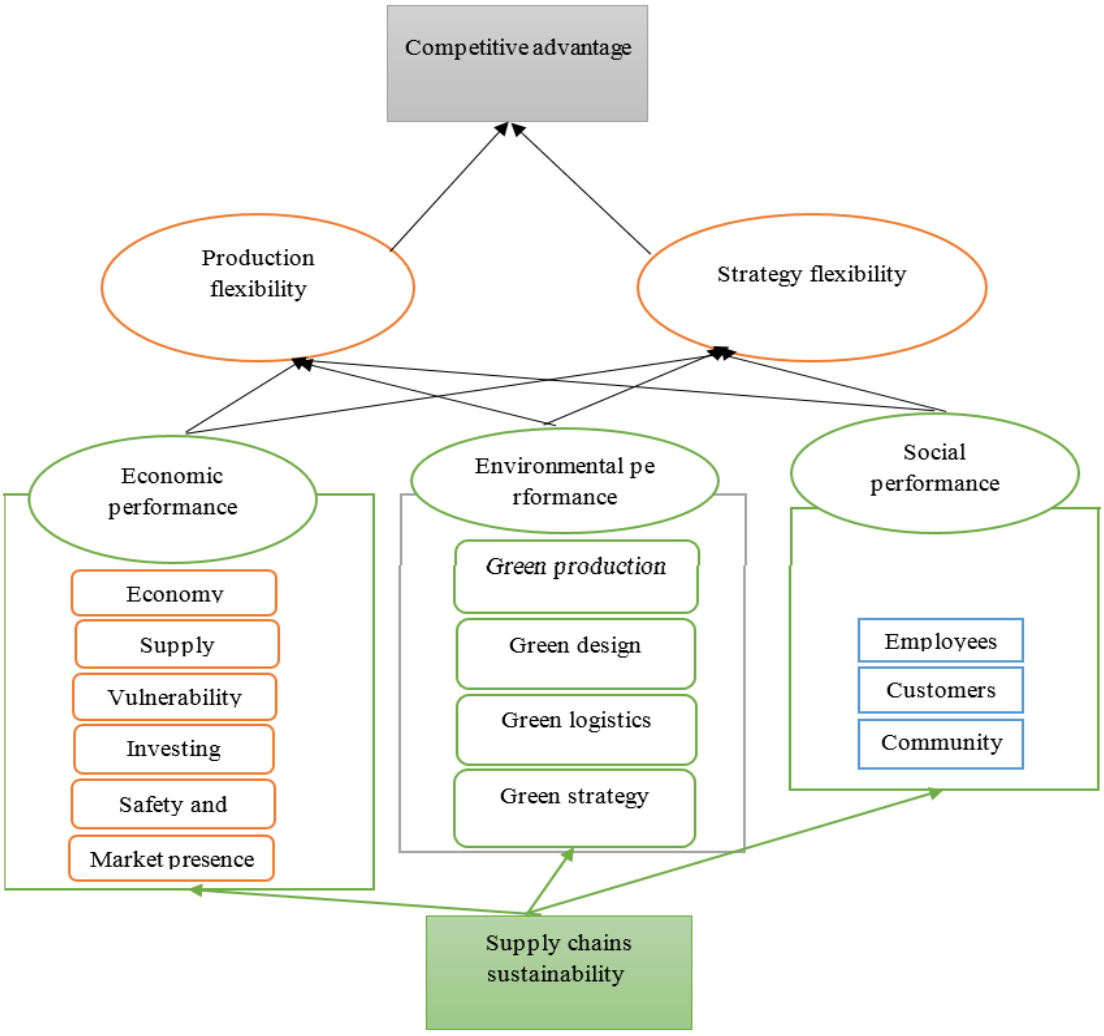

Figure 1. Conceptual model of research

3.2 Research hypotheses

Hypothesis 1: There is a significant impact of the economic dimension of supply chain sustainability on production flexibility.

Hypothesis 2: The economic dimension of supply chain sustainability significantly influences strategic flexibility.

Hypothesis 3: The environmental dimension of supply chain sustainability has a notable effect on production flexibility.

Hypothesis 4: The environmental dimension of supply chain sustainability significantly impacts strategic flexibility.

Hypothesis 5: The social dimension of supply chain sustainability has a significant influence on production flexibility.

Hypothesis 6: The social dimension of supply chain sustainability significantly affects strategic flexibility.

Hypothesis 7: Production flexibility significantly contributes to sustainable competitive advantage.

Hypothesis 8: Strategic flexibility significantly contributes to sustainable competitive advantage.

The collected data from the questionnaire was subjected to appropriate statistical analysis to examine the connections between variables and test the hypotheses. The research findings unveiled the following outcomes:

Hypothesis 1 was supported, indicating that the economic dimension of supply chain sustainability has a significant impact on production flexibility. This implies that economic factors, such as economic performance, supply procedures, vulnerability, investment, product safety and quality, and market presence, influence an organization's ability to achieve production flexibility.

Hypothesis 2 was also supported, indicating that the economic dimension of supply chain sustainability has a significant effect on strategic flexibility. This suggests that economic factors play a role in shaping an organization's strategic flexibility, enabling it to adapt and respond effectively to environmental changes and uncertainties.

Hypothesis 3 found support, indicating that the environmental dimension of supply chain sustainability has a significant effect on production flexibility. This implies that factors related to green production, green logistics, green design, and green strategy, including materials and energy, water, atmosphere, biodiversity, and animal welfare, impact an organization's ability to achieve production flexibility.

Hypothesis 4 was supported, suggesting that the environmental dimension of supply chain sustainability has a significant effect on strategic flexibility. This means that environmental factors influence an organization's strategic flexibility, allowing it to align its strategies with sustainable practices and respond to environmental challenges.

Hypothesis 5 found support, indicating that the social dimension of supply chain sustainability has a significant effect on production flexibility. This suggests that social factors, including criteria related to employees, customers, and the community, influence an organization's ability to achieve production flexibility.

Hypothesis 6 was supported, indicating that the social dimension of supply chain sustainability has a significant effect on strategic flexibility. This implies that social factors shape an organization's

strategic flexibility, including aspects such as employee welfare, customer satisfaction, and adherence to community standards.

Hypothesis 7 received support, suggesting that production flexibility has a significant impact on sustainable competitive advantage. This means that organizations with higher levels of production flexibility are more likely to achieve a sustainable competitive advantage in the market.

Hypothesis 8 was also supported, indicating that strategic flexibility has a significant effect on sustainable competitive advantage. This implies that organizations with greater strategic flexibility are more likely to attain and maintain a sustainable competitive advantage.

Overall, the research findings provide empirical evidence for the relationships between the dimensions of supply chain sustainability, flexibility, and sustainable competitive advantage. They underscore the importance of economic, environmental, and social factors in shaping organizational performance and success within the context of supply chains.

3.3 Checking the Normality of Data

To determine the suitable statistical test, the initial step involves assessing whether the variable distribution is normal or non-normal. The Kolmogorov-Smirnov test is commonly used for this purpose, as it measures the degree of normality. The test outcomes for the primary factors are displayed in Table 3.

H0: The observations are distributed according to a normal distribution.
H1: The observations deviate from a normal distribution.

Table 3. Kolmogorov Smirnov test results

Variable	Kolmogorov-Smirnov test	Significance level	Condition
economic dimension	1.164	0.133	Normal
environmental dimension	1.168	0.131	Normal
social dimension	1.680	0.07	Normal
Production flexibility	1.251	0.087	Normal
Strategic flexibility	1.114	0.167	Normal
sustainable competitive advantage	1.530	0.154	Normal

The results displayed in the table indicate that the significance level of all variables is above 5%. As a result, this confirms that the variables adhere to the assumption of normality and follow a normal distribution.

3.4 Correlation coefficients (Pearson correlation)

To assess the structural model between the variables, the correlation matrix was initially computed to examine the relationships among the research variables. Pearson correlation coefficient was utilized for this analysis considering the normal distribution of the data. The results, presented in Table 4, indicate that the correlation coefficients between the research variables are statistically significant.

Table 4. Correlation coefficients

Variable	Economic dimension	Environmental dimension	Social dimension	Production flexibility	Strategic flexibility	Sustainable competitive advantage
economic dimension	1.00					
environmental dimension	0.660	1.00				
social dimension	0.852	-	1.00			
Production flexibility	0.603	-	-	1.00		
Strategic flexibility	0.405	-	-	-	1.00	
Sustainable competitive advantage	0.684	-	-	-	-	1.00

3.5 Testing the hypotheses and analyzing the conceptual model using structural equations

To ensure the accuracy and validity of the identified indicators in measuring the dimensions or structures, the first step in structural equation modeling is to examine the validity of the structure. This is accomplished through the use of confirmatory factor analysis (CFA). In CFA, the t-value of each indicator's factor loading with its corresponding structure is examined, with a threshold of 1.96 indicating statistical significance. If the condition is met, it signifies that the indicator adequately measures the intended structure or latent attribute. The results of this analysis are presented in Table 5, where parameters with values greater than 1.96 are considered statistically significant.

In addition to structural validity, convergent validity, and discriminant validity are essential in the structural equation model. Convergent validity assesses the correlation between indicators of different structures. In Smart PLS software, the average variance extracted (AVE) indicator is employed to evaluate convergent validity. A value of 0.4 or higher for the AVE is deemed acceptable. Discriminant validity, on the other hand, indicates a partial distinction between indicators of one structure and those of another. To calculate discriminant validity, the square root of the average of the extracted variances (AVE) is utilized. For each structure, the AVE value should exceed the correlation values of that structure with other structures.

Reliability is assessed using Cronbach's Alpha, with a standard value of 0.7 indicating high reliability. Based on the results presented in Table 5, all the criteria mentioned, including reliability and validity, meet the stated standards, indicating that they are at an appropriate level.

Table 5. Validity and reliability of the measurement model and fitness of the general model

Study variables	Items	Factor loads	t-value	Cronbach's alpha	Composite Reliability	R^2	AVE	Share index	Redundancy index	GOF
Dimension Economic	Question 1	0.626	12.913	0.805273	0.863165	0.671871	0.51956	0.519362	0.433096	0.616
	Question 2	0.515	7.414							
	Question 3	0.751	24.499							
	Question 4	0.879	54.398							
	Question 5	0.803	28.236							
	Question 6	0.692	14.359							
Environmental Dimension	Question 1	0.919	100.342	0.861857	0.906232	0.519658	0.70898	0.708294	0.359421	
	Question 2	0.782	23.483							
	Question 3	0.784	25.077							
	Question 4	0.873	62.088							
Social Dimension	Question 1	0.758	16.361	0.654652	0.810224	0.287340	0.58714	0.587452	0.242567	
	Question 2	0.792	25.636							
	Question 3	0.750	19.010							
Functional Flexibility of Production	Question 1	0.770	29.449	0.759811	0.838466	0.780859	0.51045	0.510374	0.387198	
	Question 2	0.763	23.005							
	Question 3	0.666	16.309							
	Question 4	0.685	16.614							
	Question 5	0.691	18.754							
Strategic Flexibility	Question 1	0.727	21.325	0.767773	0.833860	0.452653	0.48638	0.496089	0.162143	
	Question 2	0.678	5.864							
	Question 3	0.616	9.610							
	Question 4	0.608	9.672							
	Question 5	0.702	18.489							
	Question 6	0.684	18.775							
	Question 7	0.772	19.324							
	Question 8	0.436	5.908							
Sustainable Competitive Advantage	Question 1	0.660	15.050	0.882239	0.903844	0.474158	0.39687	0.486588	0.070004	
	Question 2	0.784	28.946							
	Question 3	0.671	14.290							
	Question 4	0.643	14.644							
	Question 5	0.713	18.934							
	Question 6	0.605	9.169							
	Question 7	0.724	16.777							
	Question 8	0.648	14.174							
	Question 9	0.678	18.382							

Question 10	0.819	42.103		
Average			0.530	0.551

3.6 Structural model (hypothesis testing)

The research model was created using Smart PLS software. It comprises one independent variable, Sustainable Competitive Advantage, and three dependent variables: Economic Dimension, Environmental Dimension, and Social Dimension. Additionally, there are two intermediate variables: Functional Flexibility of Production and Strategic Flexibility.

In the visual representation of the model, latent variables are represented by circles, while observable variables are depicted as rectangles. The connections between latent and observable variables, known as factor loads, demonstrate the relationships between hidden and explicit variables.

To test the hypotheses and establish the relationships between latent and observable variables, structural equations are utilized. The coefficients in these equations, referred to as path coefficients, quantify the strength and direction of the relationships.

The significance of the relationship between the independent variable and the dependent variable is assessed using the t-value. For statistical significance at a confidence level of 0.995%, the t-value must fall outside the range of -1.96 to +1.96. This threshold is employed to evaluate the significance of the relationships between variables in the research model.

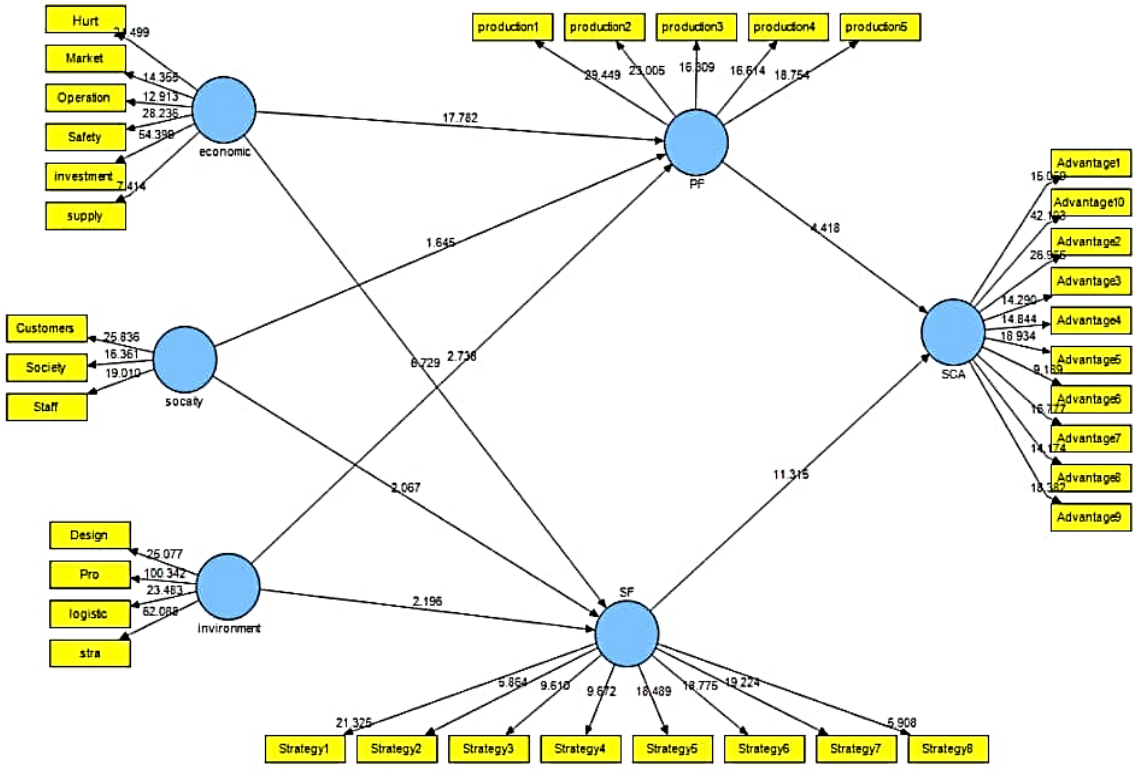

Figure 2. Structural equation model with t-value

Taking into account that standard load factor values typically fall within the range of -1.96 to +1.96, the structural equation model can be analyzed at a significance level to assess the impact of Chain Sustainability Dimensions on Sustainable Competitive Advantage.

Based on Figures 2 and 3, a table was generated as follows:

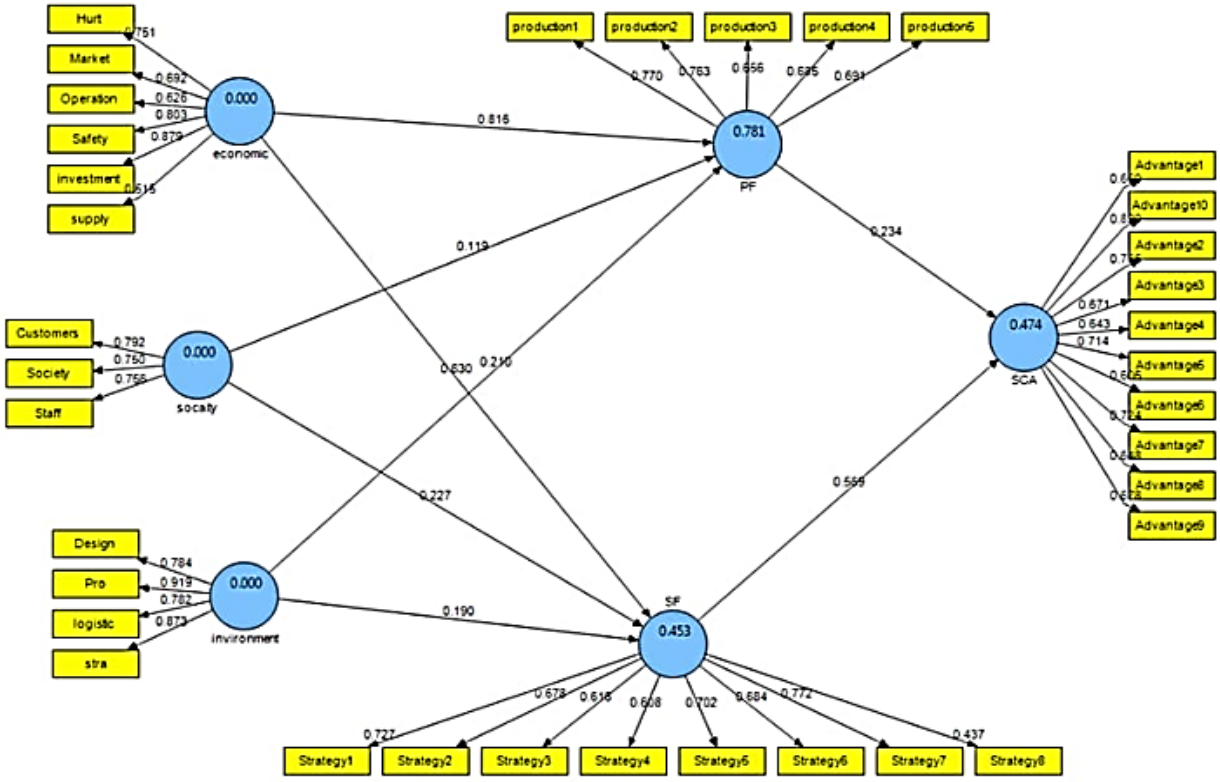

Figure 3. Structural equation model with path coefficients

3.7 Hypothesis analysis

The table below presents the results of the path analysis conducted on the hypotheses within the structural equation model. It confirms all the hypotheses except for hypothesis (5), as the path coefficient falls within the range of +1.96 and -1.96.

Based on these results, we can summarize the verification as follows:

The first hypothesis confirms a positive and significant impact of the economic dimension on production flexibility.

The second hypothesis confirms a positive and significant impact of the economic dimension on strategic flexibility.

The third hypothesis confirms a positive and significant impact of the environmental dimension on production flexibility.

The fourth hypothesis confirms a positive and significant impact of the environmental dimension on strategic flexibility.

The fifth hypothesis does not confirm a positive and significant impact of the social dimension on production flexibility.

The sixth hypothesis confirms the lack of a positive and significant impact of the social dimension on strategic flexibility.

The seventh and eighth hypotheses confirm a positive and significant impact of production and strategic flexibility on sustainable competitive advantage.

The table describes the model statistics.

Table 6. Summary of results of hypothesis testing

Hypothesis	Independent variable	Dependent variable	Path coefficient	T statistic	Test result
1	economic dimension	production flexibility	0.815	17.781	Confirmed
2	economic dimension	strategic flexibility	0.630	6.729	Confirmed
3	environmental dimension	production flexibility	0.209	2.737	Confirmed
4	environmental dimension	strategic flexibility	0189	2.196	Confirmed
5	social dimension	production flexibility	0.119	1.644	Un Confirmed
6	social dimension	strategic flexibility	0.227	2.066	Confirmed
7	production flexibility	sustainable competitive advantage	0.233	4.418	Confirmed
8	strategic flexibility	sustainable competitive advantage	0.568	11.315	Confirmed

4. Conclusion

Based on the information provided in the research introduction and conducted studies, it can be concluded that competition in the modern economy extends beyond individual companies and includes competition between supply chains. Sustainable supply chain management has emerged as a crucial aspect in this context. However, maintaining a competitive advantage for manufacturing companies has become increasingly challenging due to global and domestic market changes.

The objective of this study was to examine the influence of sustainable supply chain dimensions on achieving sustainable competitive advantage in the dairy industry of Fars Province, with a focus on the intermediary role of production flexibility and strategic flexibility. The study included eight hypotheses, three of which explored the relationship between sustainable supply chain components and production flexibility, three hypotheses evaluated the relationship between sustainable supply chain components and strategic flexibility, and the remaining two hypotheses measured the relationship between production flexibility, strategic flexibility, and sustainable competitive advantage.

The study results confidently indicate, with a 95% confidence level, that the economic dimension of supply chain sustainability has a significant and positive effect on production flexibility. This finding aligns with previous research conducted by Kumar et al. [26], Eryesil, Esmen, and Beduk [27], and Agha et al. [21]. Furthermore, the research findings indicate a positive and significant relationship between strategic flexibility and the economic dimension of sustainability, which is consistent with the results obtained by the aforementioned researchers.

Investing in versatile machinery, diversifying production processes, and creating capacity for increased production contribute to improving operational flexibility and strategic flexibility. These actions enable organizations to have alternative options and separate programs to address future

uncertainties and facilitate rapid changes in competitive strategies, thereby enhancing strategic flexibility.

The environmental sustainability variable was found to have a positive and significant impact on production flexibility, with a confidence level of 95%. This finding is in line with research conducted by Chan, C. [7], Kumar et al. [26], Eryesil, Esmen, and Beduk [27], Abdul Malek et al. [17], and Agha et al. [21]. These studies demonstrated that organizations adopting environmental and ethical performance indicators enhance production and operational processes, leading to long-term economic benefits and accelerated innovation.

However, the research findings indicate that the social dimension of supply chain sustainability does not significantly affect production flexibility at a 95% confidence level. This result is consistent with the studies conducted by Kumar et al. [26], Eryesil, Esmen, and Beduk [27], and Agha et al. [21]. Nevertheless, the social dimension does have a positive and significant effect on strategic flexibility at a 95% confidence level.

Regarding the relationship between production flexibility and sustainable competitive advantage, the findings of this research align with the results obtained by Ebrahimpour Azbari [23], Heidari et al. [3], Das [24], Ding et al. [25], Chan et al. [7], Eryesil, Esmen, and Beduk [27], Abdul Malek et al. [17], Agha et al. [21], and Kim et al. [28], collectively supporting the relationship between production flexibility and sustainable competitive advantage.

Similarly, the results regarding the relationship between strategic flexibility and sustainable competitive advantage are consistent with the research findings of Ebrahimpour Azbari [23], Ahmadi Saravani (2017), Das [24], Ding et al. [25], Agha et al. [21], Kim et al. [28], indicating a relationship between strategic flexibility and company performance. To succeed in dynamic and changing environments and achieve a competitive advantage, organizations should enhance their strategic and production flexibility. Managers need to develop flexible processes and structures, foster an innovative culture within the organization, and consider adopting flat and horizontal organizational structures to facilitate quick decision-making and implementation.

Based on the research findings, it is claimed that supply chain sustainability has a positive effect on competitive advantage in the dairy industry. It leads to increased customer accountability, faster response to environmental changes, and customer demands. Effective mechanisms should be in place within organizations to translate high-level strategic strategies into daily operations, creating sustainable competitive advantages. Employees should receive training and empowerment in strategic and productive programs to prepare them for future conditions and enable them to perform their roles effectively.

The study concludes with several recommendations for further research and practical implications, including focusing on making supply chains more sustainable, investing in production flexibility, enhancing strategic flexibility, establishing effective mechanisms to translate strategies into daily operations, and exploring the impact of sustainable supply chain management in other industries and regions. Managers should prioritize sustainability initiatives and integrate them into their overall business strategy, collaborating with stakeholders to develop sustainable practices and create shared value. Overall, this research highlights the importance of sustainable supply chain management and its impact on achieving sustainable competitive advantage through economic, environmental, and social dimensions, as well as production and strategic flexibility.

5. References

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