

Enhancing Supply Chain Performance for Sustainable Development in the Small and Micro Industries The Role of Organizational and Local Culture, Support from Financial Institutions, and Government

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ABSTRACT

The economic growth potential of North Sumatra is globally recognized due to the achievement of sustainable development goals. This research aims to explore the integration of environmental, social, economic, organizational, local culture, government, and financial institution support factors that can improve supply chain performance and sustainability for small and micro industries in North Sumatra. The study uses a mixed-methods approach that involves in-depth interviews and structured questionnaires to examine the central roles of these factors. The findings underscore the importance of environmental considerations in supply chain management, the impact of local cultural traditions on organizational performance, and the need for innovative economic solutions to improve efficiency and traceability by government and financial support. The research also suggests the implementation of comprehensive policies that integrate all aspects of collaboration to achieve the Sustainable Development Goals in North Sumatra, addressing deglobalization and geopolitical crises.

Keyword: *sustainability, supply chain, small and micro industries, policies.*



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1. Introduction

The potential of North Sumatra for economic and industrial growth has been widely recognized across Indonesia due to the province's significant strides of the province towards achieving the sustainable development goals ([Harahap & Nugrahadi, 2019](#)). As a province on Sumatra Island, North Sumatra has abundant economic resources, including rich agricultural lands and diverse natural resources ([Hasibuan et al., 2021](#)). The sustainable development goals in Indonesia present significant economic challenges to industries, as they require these entities to adapt their operations and business models to align with the environmental, social and governance principles underlying the sustainable development agenda ([Rahmadani et al., 2020](#)).

These goals need to adapt and respond to the disruptive dynamics of the contemporary period, encompassing the trends of de-globalisation and geopolitical crises that arise from the heightened integration of global economies and trade flows ([Transforming our World: The 2030 Agenda for Sustainable Development, 2020](#)). The strategic location along major trade routes, abundant natural resources and a growing industrial base have placed it as a key driver of Indonesia's overall economic progress, particularly in the small and micro industrial sectors ([Berawi et al., 2017](#)). Small and micro industries are part of small and micro enterprises (SMEs) that are engaged in production activities, such as manufacturing, processing and extraction of natural resources, which are essential for the local and national economy due to sustainability ([Rana & Choudhary, 2019](#)). Previous research has shown that small and micro industries have played a crucial role in supporting economic growth, creating employment opportunities, and reducing poverty levels in various countries within the region ([Andaregie et al., 2021](#)).

Based on the BPS data (2024), North Sumatra faces considerable socio-economic challenges, with the province ranking fourth in Indonesia for the number and percentage of poor people, at 8.15%. Most of the province's micro and small industries are struggling, with 79% industries experiencing difficulties managing their businesses. Furthermore, a staggering 91% of industries have not received any assistance from government bodies, private institutions, banking institutions, or foundations. This region faces substantial socioeconomic hurdles, with a high poverty rate and certain industries struggling to manage their operations. Importantly, this situation impacts the sustainability of the local economy (Gabon Poverty Assessment, 2020).

Effective supply chain management can improve the productivity, cost efficiency, and competitiveness of small and micro industries by optimising their logistics, inventory, and procurement processes (Thoo et al., 2017). This can improve their operational efficiency, reduce waste, and enable them to respond to market demands in a timely and cost-effective manner, ultimately contributing to their sustainability (Silva et al., 2021). It can strengthen their competitive position and enable them to better navigate the challenges posed by the evolving business landscape, including the impacts of deglobalisation and geopolitical crises (Ghauri et al., 2021).

Improving the performance in supply chain management of micro and small industries has been identified as a crucial factor in addressing these challenges and advancing sustainable development in Indonesia (Ansofino et al., 2019). However, the existing literature has not adequately explored the role of organizational culture, financial institutions, and government policies in improving supply chain performance and driving sustainable development in the small and micro industries (Tampubolon, 2018).

Research has identified key impediments faced by small and micro industries in Indonesia, including lack of capital, skills, and technology, which hinder their competitiveness (Indrawati et al., 2020). Financial and government support can improve the access of small and micro industries to capital, enhance their marketing and sales capabilities, and strengthen their human resource development, thus strengthening their overall operational and competitive capabilities (Bharadwaj et al., 2018). Existing research has shown that environmental factors as part of the supply chain management of small and micro industries have a significant and direct positive impact on the sustainability of these businesses (Machado et al., 2020).

Research has shown that incorporating local cultural traditions and organizational practices into supply chain management strategies can significantly influence the performance and development of small and micro industries (Baz & Iddik, 2020) (Mohammed & Ngeno, 2019). As a province, North Sumatra has historically applied local cultural practices to various facets of its economic activities (Harahap & Nugrahadi, 2019). Integrating the organizational culture and existing business practices could enable these industries to improve their sustainability and contribute to the Sustainable Development Goals (Kumar et al., 2023).

A holistic approach that combines financial and government support, as well as integrating organizational culture, can empower small and micro industries to improve their supply chain performance (Ndubisi et al., 2021) (Kumar et al., 2023) (Osei et al., 2023). The holistic approach is accompanied by a conceptual framework that offers a robust and multidimensional perspective on the complex challenges facing small and micro industries, acknowledging the significance of sustainable supply chain management.

This research examines the ways in which the integration of organizational culture, financial institution support, and government intervention can enhance supply chain performance and sustainability for small and microscale industries in North Sumatra. It comprehensively explores the critical roles of these factors in empowering small and micro industries to enhance their supply chain performance and unlock their full sustainability growth potential (Silva et al., 2021). By exploring the complex interplay of these key factors, the study will provide nuanced insights into how small and micro industries can overcome persistent operational challenges and leverage their supply chains to achieve holistic long-term sustainability. (Leu et al., 2021). The investigation will uncover strategies and best practices that enable these industries to integrate their organizational culture, effectively leverage financial and government support, and optimise their supply chain management, ultimately positioning them to thrive in the evolving business landscape and contribute meaningfully to the Sustainable Development Goals (Osei et al., 2023).

The study will use a multimethod approach, employing in-depth interviews and structured questionnaires to comprehensively examine the proposed hypotheses regarding the sustainability of supply chain frameworks for the small and micro industries ([Avelar-Sosa et al., 2018](#)), ([Aityassine et al., 2022](#)), ([Osei et al., 2023](#)). The study will conduct in-depth interviews with industry owners and their supply chain stakeholders to gather valuable information on the challenges, strategies, and best practices surrounding the integration of organizational culture, financial institution support, and government interventions aimed at improving supply chain performance and sustainability. Additionally, structured questionnaires will be employed to systematically collect quantitative data on the environmental, social, and economic aspects of the supply chain framework.

This research will offer comprehensive strategy recommendations to improve the sustainability of supply chains for small and micro industries in North Sumatra Province. The proposed approach involves the strategic integration of organizational culture, financial institution support, and government intervention. The study will provide nuanced insights into how these pivotal factors can be used synergistically to improve the performance of the supply chain and the overall sustainability of these industries. The recommendations will outline concrete actionable steps to cultivate more resilient and environmentally friendly supply chain practices, ultimately contributing to the achievement of the Sustainable Development Goals in the region.

2. Literature Review

2.1. Sustainable Supply Chain Management of Small and Micro Industries

In the context of global economics, the supply chains of small and micro-industries play a crucial role in driving sustainable development ([Sánchez-Flores et al., 2020](#)). These industries are integral components of the broader economic landscape, and the efficiency and sustainability of their supply chain operations have significant implications for long-term economic, environmental, and social progress ([Tebaldi et al., 2018](#)). As such, understanding and enhancing the supply chain performance of these industries is vital to achieve holistic and lasting sustainability on a global scale.

2.2. Conceptual Framework for Sustainable Supply Chain Performance

Previous research has proposed a framework for evaluating sustainable supply chain performance that considers environmental, social, and economic indicators. The framework proposed by Yan et al. ([2019](#)) is particularly relevant for small and micro industries, as they often face unique challenges in navigating the complexities of supply chain management while balancing sustainability considerations. These industries typically have limited resources, face greater operational constraints, and must face more pressing sustainability concerns compared to their larger counterparts.

According to Sánchez-Flores et al. ([2020](#)), the sustainable supply chain performance framework is based on three key criteria: social, economic and environmental factors. This framework emphasises the need to consider these three interconnected dimensions to make more informed decisions and implement strategies that foster long-term sustainability. Organizational culture and employee normative commitment have been found to significantly influence the sustainability of industries' supply chain frameworks ([Lazar et al., 2022](#)). Osei et al. ([2023](#)) also suggested that organizational cultures characterized by development, hierarchy, and group orientation positively impact supply chain performance, with the relationship mediated by external integration.

2.3. Environmental Factors in Sustainable Supply Chain Performance Framework

The evaluation of environmental factors within the supply chain is crucial as it offers valuable insight into the sustainability and environmental implications of operational processes ([Feng & Xiong, 2020](#)). This involves scrutinising the utilization of materials, energy consumption, greenhouse gas emissions, and waste management practices ([Roy et al., 2020](#)). Analysing the use of raw materials and packaging can help identify opportunities to improve resource efficiency, increase recycling, and incorporate environmentally friendly alternatives ([Maksum, et al., 2020](#)).

Environmental factors exert a substantial influence on the financial dimension of sustainable supply chain performance, often conceptualized as the "green economy" ([Leu et al., 2021](#)). These environmental considerations play a pivotal role in determining the financial viability and long-term sustainability of small and micro industries, as they must reconcile the demands of operational sustainability with the imperative of economic competitiveness. By addressing environmental factors within the supply chain, these industries can

realise cost savings, improve resource efficiency, and unlock new market opportunities, thus bolstering their overall financial sustainability ([Roy et al., 2020](#)).

2.4. Social Factors in Sustainable Supply Chain Performance Framework

Social indicators in sustainable supply chain measure factors such as improvement in health and safety, increase in social development project, local employment, improvement in equal opportunity, consistent employee training ([Guo & Wu, 2022](#)). Government support for human resource development in small and medium industries has a significant impact on social factors within the supply chain. This support can improve worker health and safety, increase local community development initiatives, enhance employment opportunities, promote equal opportunity, and provide consistent employee training programmes ([Hung, 2021](#)). By investing in the workforce of these industries, the government can foster a more socially responsible and sustainable supply chain that generates positive outcomes for workers, families, and local communities ([Farmania et al., 2021](#)).

According to the literature ([Singh & Maheswaran, 2023](#)), the social and environmental aspects within the supply chain are inherently interlinked and exert a profound influence on the overall sustainability of supply chain performance. For example, improvements in worker health and safety can drive reductions in environmental impacts, such as reducing waste or emissions. In contrast, the incorporation of environmentally conscious practices can generate positive spillover effects on the local community and workforce, which are also shaped by the prevailing local cultural norms ([Neto et al., 2022](#)). Acknowledging and capitalising on this synergistic relationship between social and environmental factors is crucial for small and micro-industries seeking to enhance the sustainability of their supply chain operations.

2.5. Economic Factor in Sustainable Supply Chain Framework

Economic indicators in sustainable supply chain performance assess factors such as financial viability, cost efficiency, and overall profitability of supply chain operations ([Rezaee, 2018](#)). This includes a comprehensive evaluation of the industries' access to and utilization of financial resources, their ability to effectively manage costs across the various stages of the supply chain, their revenue generation capacity, and their overall financial performance and viability. Assessing these economic factors provides crucial insights into the financial sustainability and profitability of supply chain operations, which are essential for the long-term success and growth of these small and micro industries ([Silva et al., 2021](#)).

Small and micro industries often face difficulties in obtaining sufficient and affordable capital to invest in eco-friendly technologies, implement green logistics practices, or withstand economic instability. This highlights the need for financial institutions and government support to address the economic factors that impact their supply chain performance ([Khan et al., 2021](#)). Access to adequate and affordable financing from financial institutions is crucial to fostering the growth and sustainability of supply chain operations in small and micro enterprises. These industries commonly face significant challenges in securing sufficient capital, which hinders their ability to invest in environmentally friendly technologies, implement green logistics practices, or weather economic volatility ([Ullah et al., 2021](#)). Obtaining financial support from institutions can empower these industries to overcome these obstacles and reinforce the financial viability and long-term sustainability of their supply chain activities. Leveraging such financial resources is vital for small and micro enterprises to enhance their economic competitiveness, promote environmental stewardship, and generate positive social impacts within their local communities ([Malesios et al., 2021](#)).

2.6. Organization and Local Cultural Tradition in Supply Chain Performance

Existing studies have emphasized the critical importance of meaningfully integrating local cultural traditions and organizational practices into the supply chain management strategies of small and micro industries ([Mohammed & Ngeno, 2019](#)) ([Nguyen et al., 2020](#)). Small and micro-industries in development country are often deeply embedded within their local communities and are influenced by unique cultural norms, values and practices. These local cultural traditions can significantly impact the way these industries structure and manage their supply chain operations, their approach to sustainability, and their overall performance ([Liang et al., 2018](#)) ([Silva et al., 2021](#)). As indicated by previous research by Osei et al. (2023), external integration serves as a mediating factor between organizational culture and the sustainability of supply chain performance.

2.7. Conceptual Framework

The conceptual framework will be developed on the basis of the background provided and literature review. The framework will investigate the connections between organizational culture, employee normative commitment and the sustainability of supply chain performance, focussing on environmental, social, and

economic factors. A particular focus will be placed on how these elements influence supply chain management strategies and overall performance of small and medium industries, given their distinct challenges in navigating the complexities of sustainable supply chain management. The conceptual framework is shown in Fig 1.

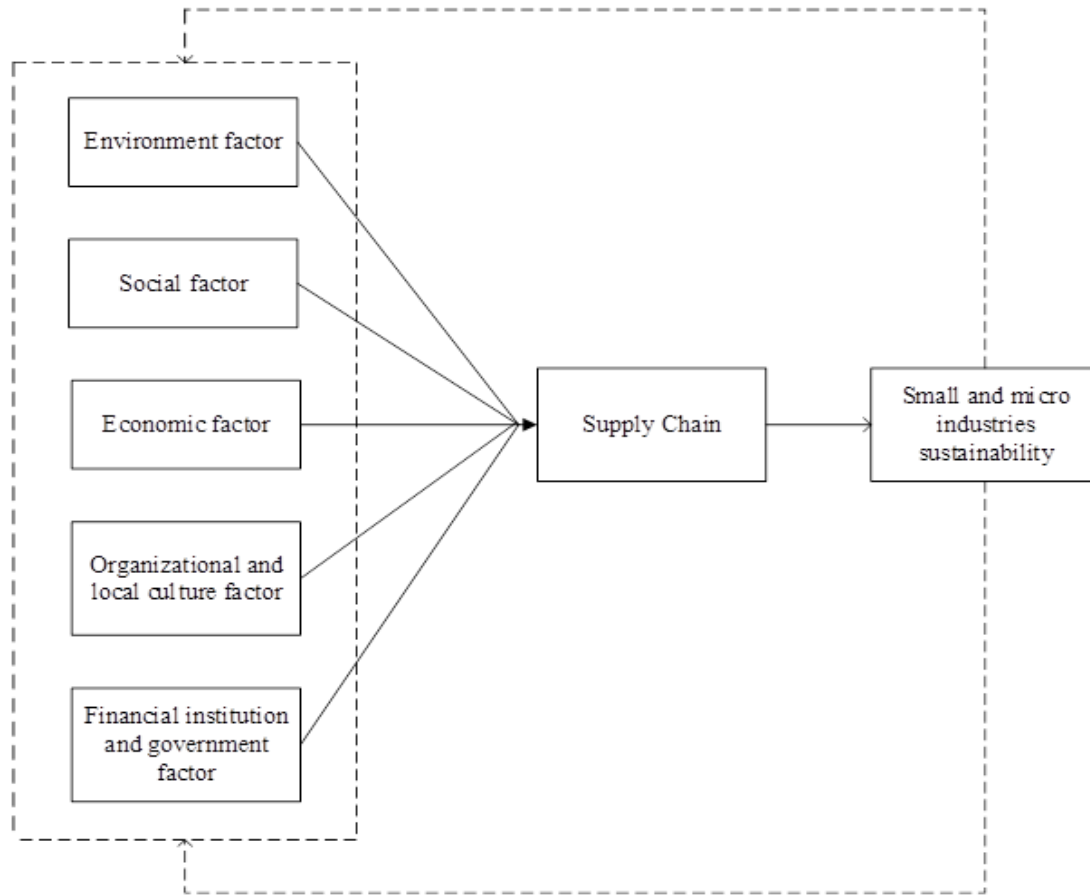


Figure1. Conceptual Framework

2.8. Statistical Methods

Lazar et al. (2022), in their study, tested the validity of the Confirmatory Factor Analysis (CFA) method to evaluate the supply chain framework of the industry. Confirmatory Factor Analysis (CFA) is a statistical technique that focuses on the relationship between observed measurable variables and latent variables that cannot be directly measured (Shrestha, N., 2021). This method enables researchers to test and validate the factor structure proposed in previous studies by examining the relationships between observed variables and their underlying latent constructs. This approach allows researchers to confirm whether the measured variables adequately represent and reflect the broader, predetermined factors, thereby providing insight into the validity and reliability of the measurement model.

T-Values (t):

$$t = \frac{(\bar{x} - \mu)\sqrt{n}}{s} \quad (1)$$

The T-value in CFA indicates the significance of the relationship between observed variables. Here \bar{x} , denotes the sample mean, μ is the population mean, n is the sample size, and s is the sample standard deviation.

Cronbach-Alpha (α):

$$\alpha = \left[\frac{k}{(k-1)} \right] \left(1 - \frac{\sum s_i^2}{s_{total}^2} \right) \quad (2)$$

Cronbach's Alpha represents the reliability of internal consistency within each factor of the framework. Measures the degree of correlation between items, indicating the reliability and coherence of these factors.

Here, k is the number of items, si^2 is the total variance of all items, and $stota^2$ is the total variance of the overall score.

Composite Reliability (CR).

$$CR = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + \sum (\theta_i)} \quad (3)$$

Composite Reliability (CR) reflects the overall reliability of a construct, considering the individual reliability of each measured item. CR also offers a stronger assessment of internal consistency than Cronbach's Alpha. In this formula, k is the number of items in the construct, λ_i is the factor loading of the i -th item, and θ_i is the error variance of the i -th item. CR values typically range from 0 to 1. A CR value above 0.7 is often considered adequate in many studies, indicating that the elements of the construct are well correlated and consistent. Conversely, a CR below 0.7 indicates that the items lack sufficient internal consistency.

CFA measurements to evaluate the supply chain framework are performed using statistical software, with a two-tailed significance level of $p < 0.05$ to test the relationships among variables. The confidence level set for statistical significance is 95%. A normality test is also performed to ensure the validity of statistical procedures by confirming that the data follows a normal distribution, with a p -value greater than 0.05.

3. Research Methods

3.1. Data Collection and Analysis

This study employs a mixed methods approach, combining both quantitative and qualitative data collection techniques Balasubramanian, S, (2020), Aityassine, YLF et al, (2022) Osei, B. M. et al, (2023). In developing the research background, statistical profile data from small and micro industries (SMIs) in North Sumatra were obtained from Statistics Indonesia (Badan Pusat Statistik) for the period 2020-2024.

To measure supply chain performance, quantitative data were collected through questionnaires distributed both in-person and online to owners and stakeholders of SMIs in North Sumatra. The structured questionnaire captured the evaluations, attitudes, opinions, and perspectives of the respondents on each factor in the supply chain framework using a five-point Likert scale. The Likert scale interpretation in the questionnaire was as follows:

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly Agree

The results of the questionnaire were statistically analyzed using the Confirmatory Factor Analysis (CFA) method to determine the relationships among factors in the supply chain framework for small and micro industries in North Sumatra based on the formulated hypotheses.

Furthermore, qualitative data was collected through direct interviews with owners and stakeholders of SMIs in North Sumatra, covering the key factors that influence supply chain sustainability. The researchers used a thematic analysis approach to process the interview data, aiming to describe and identify the performance of the SMIs' supply chains and the factors affecting them. The interview results were validated through discussions and data triangulation, ensuring consistency, validity, and integration with the statistical results of the questionnaire analysis.

3.2. Hypothesis Development

Based on the comprehensive literature review and conceptual framework, the following hypotheses (H) will be developed:

- H1: Environmental factors have a positive and significant impact on the sustainability of supply chain performance in small and micro-industrial sectors in North Sumatra.
- H2: Social factors have a positive and significant influence on normative commitment within small and micro industries in North Sumatra.
- H3: Economic factors have a positive and significant influence on the overall sustainability of supply chain performance in small and micro industries in North Sumatra.

H4: Local and organizational culture positively and significantly moderate the relationship between environmental, social, and economic factors of sustainable supply chain performance in small and micro industries in North Sumatra.

H5: Government and financial institutions positively and significantly moderate the relationship between environmental, social, economic, and local and organizational culture factors in the sustainable supply chain performance of small and micro industries in North Sumatra.

The hypotheses will be tested using the quantitative data collected through the questionnaire. The insights gleaned from the questionnaire responses will serve to validate the proposed hypotheses and elucidate the key factors that influence the sustainable supply chain performance of small and micro industries in North Sumatra.

4. Result and Discussion

The researchers collected data from a total of 202 respondents, consisting of owners and stakeholders within the supply chains of small and micro industries (SMI) in North Sumatra. All respondents were randomly selected through online advertisements among the 120,914 SMIs in North Sumatra (Statistics Indonesia, 2022). Although randomization was attempted by broadly disseminating the survey link across multiple channels without targeting specific individuals, the sample represents a non-probability approach due to reliance on self-selection.

These respondents represented various sectors, including food, arts, and other manufacturing industries. All participants took part in interviews, either in person or online, and completed the questionnaires provided by the researchers. To avoid nonresponse bias, the researchers ensured that every respondent in the population had an equal chance of being selected, thereby optimizing the reliability and generalisability of the research findings to be analysed statistically ([Balasubramanian, S., 2020](#)), ([Rudolph, E. J. et al., 2022](#)). The detailed profile of the respondents is presented in Table 1 below.

Tabel 1. Respondents profile

Category	(%)
Respondents Characteristic	
Owner	27,19
Supplier	22,05
Manajer	24,9
Distributor	18,79
Industries	
Food and Beverage	75%
Manufacture	5%
Art	20%

The results of the interviews indicate that the owners and stakeholders of small and micro industries (SMIs) in North Sumatra demonstrate a clear understanding of the critical role played by environmental, social, economic, organizational, local cultural factors, as well as financial and governmental support in enhancing sustainable supply chain performance. A total of the 34% of respondents reported managing their industrial waste independently, reflecting their awareness of the environmental aspect of supply chain sustainability.

Meanwhile, all respondents recruited their workforce from the local community to support organizational management and utilize local cultural values. This practice highlights the respondents' attention to social, organizational, and local cultural factors in achieving supply chain sustainability.

Regarding the economic factor, 60% of the respondents indicated that they had adopted digital payment systems as part of their financial operations, although only 23% were able to access financial institutions. To improve business knowledge and capacity, 46% of respondents participated in training sessions and exhibitions organized by both central and local governments. These findings underscore the importance of financial institution and government support for owners and stakeholders in SMI supply chains in North Sumatra.

Furthermore, the statistical analysis of the results of the questionnaire, presented in Table 2, shows that each item demonstrates convergent validity, with an average value of 0.538. Then Cronbach Alpha was calculated to assess the internal consistency of the items within each group, with values ranging from 0 to 1.

Table 2. Result of Questionnaire Statistical Analysis

Variabels	T-Values	Cronbach Alpha	Composite Reliability	AVE
Environmental factor	18.175	.844	.879	.451
Social factor	24.783	.856	.863	.501
Economic factor	24.588	.843	.871	.583
Organization and local culture factor	25.019	.932	.956	.744
Financial institution and government support factor	17.182	.808	.814	.412

A higher Cronbach's Alpha value indicates better internal consistency of the items. Based on Table 2, it is evident that the local culture and organizational variable has a Cronbach's Alpha value of 0.956, indicating that this construct is measured reliably.

Discriminant validity analysis was also conducted to ensure that the different factors are not correlated with each other, thus reinforcing the validity of the measurement instrument in assessing the intended constructs. The results of the Discriminant Validity Analysis are presented in Table 3.

Table 3. Discriminant Validity

Variabels	Environmental Factor	Social factor	Economic factor	Organization and local culture factor	Financial institution and government support factor
Environmental Factor	0.713	1.613	1.913	0.123	0.251
Social factor	0.562	2.432	2.532	0.513	1.153
Economic factor	0.262	0.662	0.762	0.352	0.134
Organization and local culture factor	0.283	1.083	1.183	0.225	1.214
Financial institution and government support factor	0.763	2.693	2.793	0.135	1.681

Furthermore, the results of the hypothesis testing through statistical analysis revealed that the environmental, social, economic, organizational, local cultural factors, as well as support from financial institutions and the government have a significant influence on the sustainability of the supply chains of small and micro industries (SMIs) in North Sumatra. This significant influence is presented in Table 4, where the p-values of all factors in the hypothesis testing are below 0.05, indicating that the results are statistically significant at the 95% confidence level.

The data analysis in this study shows a correlation between the results from interviews and the questionnaire responses from the respondents. The interview data indicates that environmental, social, economic, organizational, and local cultural factors significantly impact the performance of the supply chain in SMEs, consistent with previous studies Osei, B. M. et al, (2023), Lazar, S. et al, (2022). However, SMEs in North Sumatra need more support from financial institutions and the government to improve their supply chain performance.

The results of the questionnaire indicate that environmental factors have a positive and significant impact on the sustainability of supply chain operations in SMEs in North Sumatra. This finding aligns with the statements of business owners and stakeholders in the interviews, who have taken proactive steps to manage operational waste. This means that SMEs in North Sumatra have made efforts to enhance environmental sustainability within the supply chain, in line with the research by Roy, S. et al., (2020).

The social factor, tested through the questionnaire, shows a positive and significant influence on SMEs in North Sumatra. Based on the interview results, respondents have considered social factors in the implementation of organizational management policies, integrating local culture. This approach can foster a sense of community, strong ownership among workers, and align supply chain management with local values and norms for business sustainability Nguyen, H. et al., (2020), Farmania, A. et al, (2021).

The analysis of the results of the questionnaire shows that economic factors have a positive and significant impact on the overall sustainability of the supply chain performance in SMEs in North Sumatra. This is in line with the interview findings, which show that 60% of respondents have adopted digital payment methods in their financial activities. According to research by Ullah, F. et al. (2021) and Khan, R. U. et al. (2021), attention to economic factors in the supply chain can enhance efficiency, traceability, and accessibility for SMEs.

Organizational factors and local culture, as reflected in the questionnaire results, show a positive and significant relationship with environmental, social, and economic factors in sustainable supply chain performance in SMEs in North Sumatra. Consistent with the interview results, business owners and stakeholders have integrated organizational and local cultural values into their labor management and supply chain operations policies. With this integration, SMEs can address various environmental, social, and economic challenges of the supply chain sustainably (Silva et al., 2021).

Support from financial institutions and the government has a positive and significant relationship with environmental, social, economic, and local cultural factors in enhancing the sustainable supply chain performance of SMEs in North Sumatra. The interview results also reveal that although only 46% of respondents have participated in training and exhibitions organized by local governments, only 23% have accessed funding loans, even though all respondents expect to benefit from the support of both financial institutions and the government, in line with the study by Neto, et al., (2022).

A holistic approach to all the factors tested in the industrial supply chain framework can be applied to make more accurate decisions, adopt innovative practices, and improve competitiveness and sustainability. Therefore, collaboration between business owners, stakeholders, financial institutions, and the government is necessary to determine the appropriate strategies for the sustainability of SMEs' supply chains in North Sumatra.

5. Conclusion

This study has demonstrated the integration of the important roles of environmental, economic, social, organizational, local cultural factors, and support from financial institutions and the government in the sustainable supply chain performance of SMEs in North Sumatra. The results of this study show that SMEs in North Sumatra have actively considered environmental, social, and economic factors in managing sustainable supply chains. Support from financial institutions and the government also plays a significant role in the supply chains of SMEs in North Sumatra. Therefore, the development of strategies for sustainable SME supply chains in North Sumatra must consider the integration of these various factors. In implementing these strategies, collaboration between business owners, financial institutions, and the government is necessary to address the challenges posed by deglobalization and geopolitical crises to the sustainability of SME supply chains in North Sumatra.

Based on the research results, the following strategies and policies can be proposed for the sustainability of the small and micro industry supply chain in North Sumatra:

1. Implementation of "Green Economy" in SME Supply Chains in North Sumatra
By implementing a "green economy," SMEs in North Sumatra can align environmental, social, organizational, cultural, and government and financial institution support to achieve supply chain sustainability, Maksum, R. I., et al, (2020), Ghauri, P., et al, (2021), Leu, J., et al, (2021), Ullah, F., et al, (2021), Singh, P., and Maheswaran, R, (2023). This approach can also be developed by government institutions together with financial institutions in the form of a digital platform such as websites, social media accounts, and integrated chat groups that provide guides, tutorials, and direct communication between users for SMEs in North Sumatra.
2. Improvement in Accessibility to Financial and Government Support for SMEs in North Sumatra
In addition to providing regular education, financial institutions and the government should collaborate with local cooperatives to offer loans, grants, and other incentives aligned with local cultural traditions (Riswan, R. et al., 2017). Bank Indonesia, as an independent central bank, can initiate such collaboration in an integrated and structured manner. To attract public enthusiasm, financial institutions and the government should also involve small business owners in local economic activities, for example, by implementing programmes named after local traditional events (Darku, D. N. E. and Akpan, W., 2020). To provide support for SMEs in Karo Regency, financial institutions and local governments can organize programs with names like "Modal Manen" or "Celengan Gotilon" for SMEs in Toba Regency.

The sustainable supply chain framework developed in this study is based on a review of previous studies. Various dynamics of globalization in the era of disruption could be further considered in developing the sustainable supply chain framework. Future research is also expected to measure the importance of various factors in the sustainable supply chain framework more broadly and comprehensively.

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