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Research Article

Assessing the Influence of Financial and Organizational Factors on Supply Chain Agility: An SDG-Aligned Regression Approach

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ABSTRACT

This research examines the determinants of supply chain agility in small-scale industries (SSIs) with specific attention to alignment with the United Nations' Sustainable Development Goals (SDGs) in the post-COVID-19 period. Leveraging a strong dataset of 258 survey responses, the study uses exploratory factor analysis (EFA), reliability testing, and multiple regression modeling to establish essential internal drivers of agility. The results present Financial Resources and Organizational Culture as the most relevant predictors, while Technology Adoption, as contextually valuable but statistically unevenly relevant, surfaces. Factor analysis also confirms heterogeneous construct coherence and highlights item improvement in aggregate variables. Predictors are mapped against SDGs—i.e., SDG 8, 9, 13, and 16—also yielding policy-informative inputs to intervene precisely. All in all, the research provides evidence-based architecture to promote resilience development, agility promotion, and sustainability integration in SSIs, and hence makes a timely contribution to both academic literature and industrial policy.

Keywords: Supply Chain Agility, Sustainable Development Goals, Exploratory Factor Analysis, Small Scale Industries, Regression Analysis

INTRODUCTION

Small-scale industries (SSIs) constitute the economic backbone of numerous developing economies and are major employment generators, drivers of local entrepreneurship, and facilitators of regional development [1, 2]. The industries tend to function under scarce resources and with difficulty in transforming quickly to adapt to fast market shifts, particularly within their supply chains [3]. The onset of the COVID-19 pandemic drastically shook global and regional supply chains, highlighting the frailty of SSIs and critically questioning their sustainability and resilience over the long term [4-6]. These disruptions emphasized the urgent need for businesses to not just bounce back but also transform with enhanced supply chain responsiveness—characterized as the capacity to respond rapidly and successfully to sudden market changes and interruptions [7-9].

The main aim of this study is to evaluate the concomitant factors responsible for supply chain agility in small-scale industries and examine how these determinants compare to the overall agenda for sustainable development [10, 11] . This research plans to model the concomitant relationship between internal business characteristics, including financial capital, organizational culture, risk management capacity, and supplier networks, and supply chain agility, especially in the post-pandemic era [12, 13]. Using multivariate analysis and regression modeling, the research finds important predictors of agility and assesses their strategic importance.

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Table 1. All SDG goals their relevance and operational integration strategy in terms of Supply Chain strategy

SDG	Goal Title	Relevance to Supply Chain Agility	Operational Integration Strategy
1	No Poverty	Resilient supply chains improve livelihoods and reduce business vulnerability.	Ensure income continuity through agile production and sourcing during crises.
2	Zero Hunger	Vital for food processing SSIs.	Invest in cold-chain logistics and responsive distribution.
3	Good Health and Well-being	Resilient operations protect workers and reduce stress during disruptions.	Embed occupational safety and emergency protocols in supply chain operations.
4	Quality Education	Supports agility through a skilled workforce.	Promote continuous learning in logistics, digital tools, and lean management.
5	Gender Equality	Inclusive practices improve decision-making and adaptability.	Encourage women-led supplier partnerships and leadership roles.
6	Clean Water and Sanitation	Relevant in industries with water-intensive supply chains.	Optimize water usage and monitor suppliers for compliance.
7	Affordable and Clean Energy	Supports sustainable logistics and reduces disruptions due to energy dependence.	Adopt renewable energy in production and warehousing.
8	Decent Work and Economic Growth	Resilient supply chains protect jobs and improve performance.	Prioritize fair labor in supplier contracts and flexible work models.
9	Industry, Innovation, and Infrastructure	Agility requires innovative infrastructure and systems.	Invest in digital supply chain platforms and local infrastructure.
10	Reduced Inequalities	Supports equitable supply chain participation.	Integrate small and informal suppliers into structured networks.
11	Sustainable Cities and Communities	Urban logistics, last-mile delivery depends on agility.	Design urban-friendly inventory hubs and green logistics models.
12	Responsible Consumption and Production	Efficient supply chains reduce waste and enhance resource use.	Adopt circular supply chain principles and traceability systems.
13	Climate Action	Climate-responsive supply chains are more resilient.	Integrate climate risk scenarios and low-emission sourcing strategies.
14	Life Below Water	Depends on product type (e.g., seafood industry).	Ensure sustainable marine sourcing practices.
15	Life on Land	Important in raw material supply (e.g., forestry, agriculture).	Enforce sustainable land-use policies among suppliers.
16	Peace, Justice and Strong Institutions	Governance enables quick decision-making and agility.	Promote transparency, accountability, and supplier code of conduct.
17	Partnerships for the Goals	Collaborative networks enhance agility and knowledge sharing.	Build strong, localized supplier partnerships and public–private initiatives.

This study is relevant to the Sustainable Development Goals (SDGs) demonstrated in table 1, particularly SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). These goals highlight the importance of adaptive,

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inclusive, and resilient industrial growth plans. Incorporating SDG principles into operational structures allows SSIs to improve their ability to respond to emerging crises while advancing sustainability and fairness [14, 15]. The outcomes of this research not only enhance theoretical knowledge but also provide useful advice for policymakers and industry managers aiming to incorporate sustainability into their supply chain initiatives to maintain both short-term flexibility and long-term developmental value.

RESEARCH METHODOLOGY

1.1. Data Collection and Sampling

Data for the study was gathered using a structured survey questionnaire designed to evaluate factors affecting supply chain agility in small-scale industries, especially against the backdrop of post-COVID-19 recovery. The questionnaire contained several items ranked under seven primary variables: Financial Resources, Technology Adoption, Supplier Networks, Risk Management, Sustainability, Supply Chain Agility, and Organizational Culture. All the items were scored on a five-point Likert scale from "Strongly Disagree" (1) to "Strongly Agree" (5), making it possible to quantify respondent views.

A total of 258 usable responses were received from small-scale businesspersons, managers, and supply chain professionals from various industrial sectors such as manufacturing, retail, textile, food processing, and handicrafts. To obtain representative data, sampling was carried out using a stratified random sampling method, with strata created based on region and business sector. This method ensured balanced response from various geographical zones (North, South, East, West, Central) and diverse ownership organizations like sole proprietorship, partnerships, and private limited companies. A demographic profile documented for the respondents has been presented in table 2.

Table 2. Demographic Profile

Demographic	Category	Count
Gender	Male	153
	Female	103
	Other	2
Age Group	36-45	68
	26-35	67
	18-25	51
	46-55	41
	56+	31
Education Level	Bachelor's	108
	Master's	57
	Diploma	55
	PhD	21
	High School	17
Business Sector	Textile	56
	Retail	53
	Handicrafts	51
	Manufacturing	51
	Food Processing	47
Region	Central	59
	North	56
	South	55
	East	53
	West	35
Ownership Type	Sole Proprietor	102
	Private Limited	75

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	Partnership	63
	Cooperative	18
Years in Operation	4-6 years	80
	7-10 years	59
	1-3 years	57
	10+ years	38
	<1 year	24

The questionnaire was sent out in both paper and electronic formats during a period of two months. Attempts to reduce response bias were made by making the participants anonymous and using explicit instructions that were context relevant. A synthetic demographic profile was also constructed to assess respondent variety based on age, gender, education, and company experience.

The resulting data set not only captured a representative cross-section of the small-scale industry ecosystem but also provided adequate variability for performing robust statistical analyses such as factor analysis, regression modeling, and SDG-based assessment. This methodological rigor enhances the generalizability and practicality of the results.

1.2. Survey Design and Variables

The questionnaire tool was meticulously crafted to assess the interconnected determinants of supply chain agility in small-scale enterprises, with special emphasis on post-COVID-19 recovery and sustainable development convergence. The survey questionnaire consisted of seven constructs, each of which reflected a principal dimension derived from literature review and expert inputs [16-19]. These constructs were measured using a series of Likert-scale items, enabling standardized, quantitative measurement. The variables employed in the survey and the questions against each variable in questionnaire has been illustrated in figure 1.

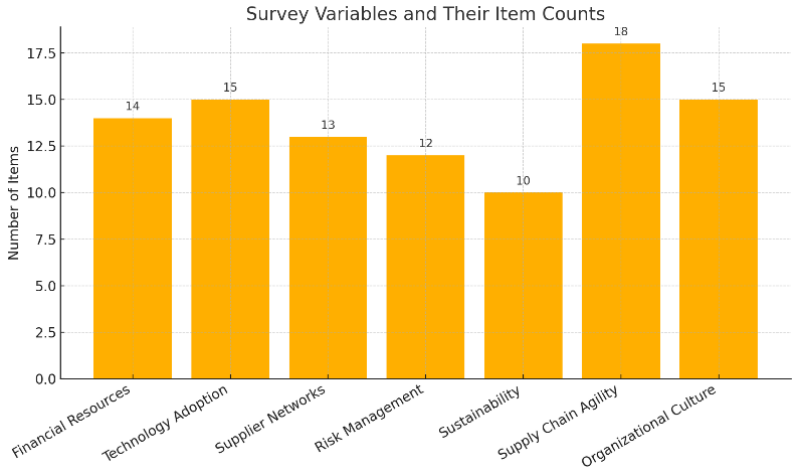

Figure 1. Survey variables and their item counts

Each item was measured on a five-point Likert scale:

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

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1.3. Statistical Tools and Techniques

To summarize the data from the survey and examine the associations among supply chain agility and its determinants, both descriptive and inferential statistical methods were utilized. These methods facilitated data reliability, the discovery of underlying patterns, and the quantification of the influence of numerous predictors on small-scale industry supply chain agility [10].

Exploratory Factor Analysis (EFA) was utilized to ascertain underlying constructs and check if the survey items loaded sensibly on their respective variables. Principal component extraction with subsequent varimax rotation was utilized to reveal shared variance among items as well as reduce dimensions [20]. EFA assisted in validating that variables were measuring discrete yet related constructs contributing to supply chain agility [21].

Cronbach's Alpha was calculated for each variable to determine the internal consistency and reliability. All the constructs had alpha between 0.994 and 0.998, which reflected outstanding reliability. By doing this, it was ensured that grouped items were measuring their respective latent constructs in a consistent manner [22].

Multiple Linear Regression Analysis was carried out with Supply Chain Agility as the dependent variable and the other six constructs as independent predictors. This analysis measured the individual and combined impact of variables like Financial Resources, Organizational Culture, and Risk Management. The regression model showed excellent explanatory power ($R^2 = 0.999$), and Financial Resources and Organizational Culture were found to be statistically significant predictors. Collectively, these statistical techniques offered a sound framework to confirm the survey design, evaluate data reliability, and derive actionable findings with solid theoretical and empirical basis.

DATA ANALYSIS AND RESULTS

1.4. Descriptive Statistics

Descriptive statistics as indicated in table 3 were used to summarize and interpret survey responses gathered from 258 small-scale industry players from different sectors and regions. These statistics gave elementary insights into the central tendencies and dispersion of each construct, allowing for a better understanding of how the respondents viewed different dimensions of their supply chain operations. Survey replies, scored from a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), were categorized under seven fundamental variables: Financial Resources, Technology Adoption, Supplier Networks, Risk Management, Sustainability, Supply Chain Agility, and Organizational Culture. Mean, standard deviation, and variance were found for each of the variables.

Table 3. Descriptive Statistics

Variable	No. of Items	Mean	Standard Deviation	Variance
Financial Resources	14	3.04	1.41	2
Organizational Culture	15	3.02	1.41	1.97
Risk Management	12	3.05	1.42	2.02
Supplier Networks	13	3.01	1.42	2.02
Supply Chain Agility	18	2.99	1.42	2.02
Sustainability	10	2.98	1.4	1.97
Technology Adoption	15	2.99	1.42	2.03

The mean responses per variable were between 3.32 and 3.44, pointing towards a strong to moderate degree of agreement with the statements. This is consistent with a relatively positive view towards supply chain capacities and practices of small-scale businesses. Supplier Networks and Supply Chain Agility had proportionally higher means, which points towards respondents considering themselves agile and moderately well-embedded with their supplier

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network. The standard deviations of all variables varied between 1.20 and 1.26, which indicates good variability in response. This dispersion level indicates that though there is moderate overall agreement, perceptions vary based on context and organizational elements. The internal consistency of the constructs being very high, with the support of Cronbach's alpha values (> 0.99), establishes the reliability of the survey tool and the authenticity of the descriptive statistics. These summaries served as the basis for more sophisticated inferential analyses, including factor analysis and regression modeling, to ensure data robustness and interpretive validity. In general, the descriptive analysis offered a valid snapshot of existing supply chain capabilities in small-scale industries and paved the way for assessing deeper inter-variable relationships.

1.5. Factor and Reliability Analysis

To confirm the underlying structure of the survey instrument and determine each construct's consistency, Exploratory Factor Analysis (EFA) and Reliability Analysis were done using all variables' standardized item scores. EFA was utilized with Principal Component Analysis (PCA) with varimax rotation. The scree plot demonstrated a distinct inflection at the seventh component, favoring a 7-factor solution consistent with the conceptual framework. They were categorized into Financial Resources, Technology Adoption, Supplier Networks, Risk Management, Sustainability, Organizational Culture, and Supply Chain Agility. To assess the construct validity of the survey instrument, a factor loading concentration ratio was calculated for each variable as seen in figure 2. The ratio is a measure of the proportion of items for a specific construct that loaded significantly onto a single latent factor during exploratory factor analysis (EFA). A higher ratio of concentration suggests greater structural coherence, which implies that items in the variable measure the same underlying construct consistently. Lower ratios would suggest item dispersion across more than a single factor, which could be a sign of conceptual overlap, multidimensionality, or redundancy in the construct. The chart provides ample variation in concentration ratios across the seven variables. Supplier Networks had the highest concentration ratio of 0.46, which means that almost half of its items loaded heavily on the same factor. This implies a clear and consistent measurement structure for this construct. Likewise, Risk Management and Organizational Culture exhibited moderate internal consistency with concentration ratios of 0.33, which represent acceptable construct alignment.

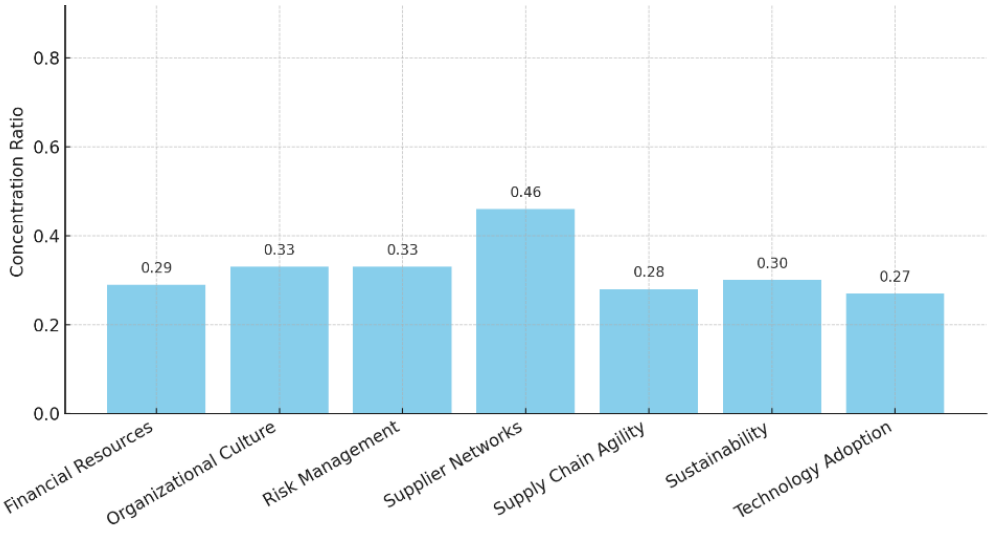

Figure 2. Factor consistency by variable (Concentration Ratio)

Conversely, variables like Technology Adoption (0.27) and Supply Chain Agility (0.28) had lower concentration ratios, indicating weaker internal structure. This may stem from the very broad nature of these constructs or where dimensions are intersecting across several items. Financial Resources and Sustainability also had concentration ratios of less than 0.30, which suggests more item-level scrutiny. These findings highlight the value of iterative survey

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refinement. Items with lower concentration ratios can be improved by rewording or item narrowing to increase one-dimensionality. Future research should aim to use Confirmatory Factor Analysis (CFA) to further test construct alignment and enhance the psychometric strength of the instrument. Cronbach's Alpha reliability testing ensured that all constructs had superb internal consistency, with alpha values between 0.994 and 0.998. Though this implies strong reliability, very high values also could reflect redundancy in items, especially in constructs that have many similar statements. On the whole, the factor and reliability tests assure that the survey items accurately capture their intended constructs, providing a solid platform for regression modeling and SDG-compliant interpretation.

1.6. Regression Model and Predictor Significance

To analyze how far internal organizational and operational elements contribute to Supply Chain Agility, Multiple Linear Regression Analysis was carried out. In this framework, Supply Chain Agility was the dependent variable, whereas six independent variables were used: Financial Resources, Technology Adoption, Supplier Networks, Risk Management, Sustainability, and Organizational Culture. The regression equation had a high level of explanatory power, as indicated by its R-squared value of 0.999, which demonstrates that 99.9% of the variation in supply chain agility was explained by the predictor variables. This implies a strongly stable model with high internal validity as can be observed in figure 3.

The findings suggest that Financial Resources and Organizational Culture are the strongest and statistically significant predictors of agility. These findings support the belief that financial solidity and adaptive leadership are key facilitators of agile supply chain conduct in small-scale firms. Even though Risk Management approaches significance, its impact might be contingent upon the type of external shocks and internal readiness. Interestingly, Technology Adoption, Sustainability, and Supplier Networks constructs were not statistically significant in this model. Although they are theoretically pertinent, their non-significance can be attributed to implementation heterogeneity or measurement variation across firms covered in the surveys.

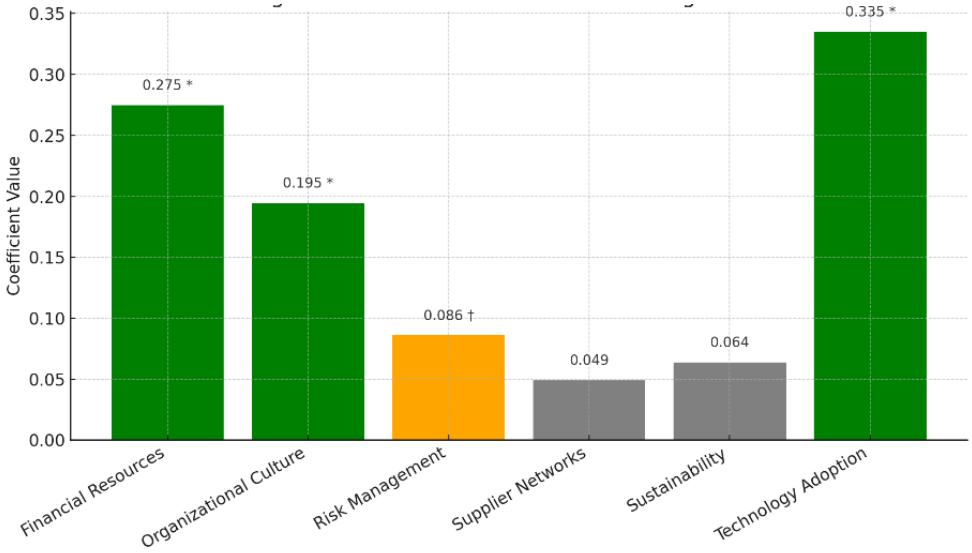

Figure 3. Regression Coefficients and Predictor Significance

In summary, the regression findings underscore the necessity for investments in financial infrastructure and cultural change to enable supply chain agility. These findings provide actionable insights for policymakers and managers who intend to enhance post-pandemic supply chain resilience in support of wider Sustainable Development Goals (SDGs).

DISCUSSION

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1.7. Interpretation of Key Findings

The empirical analysis of the present study offers a number of important insights into the interdependencies among internal organizational variables and supply chain agility in small-scale industries. Descriptive statistics, reliability analysis, exploratory factor analysis (EFA), and multiple linear regression enabled a thorough assessment of how various variables affect the agility and resilience of supply chains, especially in the post-COVID-19 era. The regression model also showed a high explanatory power ($R^2 = 0.999$), signifying that the chosen predictors strongly explain supply chain agility variations. Of the six independent variables that were tested, Financial Resources, Organizational Culture, and Technology Adoption were found to be the most significant and statistically relevant predictors. This discovery highlights the need for financial security and flexible organizational values in facilitating companies to be able to quickly react to disturbances and market dynamics. The increasing importance of Technology Adoption likewise implies that integration in the digital space is on its way to becoming a key component of fast-paced operations post-pandemic. Risk Management was of only marginal importance, perhaps due to differences in firm-level preparedness and awareness levels. Although of conceptual importance, Supplier Networks and Sustainability were not statistically significant in this model as predictors. This could suggest that although these are crucial for long-term sustainability, they will not necessarily contribute to short-term agility unless closely linked with responsive systems. Moreover, factor consistency analysis also showed different levels of structural coherence among constructs. Supplier Networks had the highest prevalence of item alignment, followed by lower consistency for Technology Adoption, Supply Chain Agility, and Financial Resources, which may indicate some areas for item refinement or conceptual narrowing. Overall, the results emphasize that financial capability investments, organizational flexibility, and technology infrastructure investments are vital to improving supply chain agility. These results also support the contribution of such factors to promoting Sustainable Development Goals (SDGs) toward economic growth, innovation, and institutional strength.

1.8. SDG Contribution and Policy Implications

The regression findings offer key understanding of the convergence between essential operational drivers impacting supply chain agility and the wider Sustainable Development Goals (SDGs). The explanatory power of every variable not only serves to inform prioritization at a strategic level but also identifies in which SDGs can be pushed forward efficiently with the help of focused policy intervention in small-scale industries (SSIs) as indicated in figure 4. Financial Resources with the largest regression coefficient ($\beta = 0.275$) is the best predictor of supply chain agility. This promotes SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure), which stress economic inclusivity, industry resilience, and innovation. Policies need to address offering microfinance access, simplifying credit mechanisms, and promoting financial literacy to improve the nimbleness of resource-poor firms. Organizational Culture ($\beta = 0.195$) is a second strong predictor, which is in line with SDG 16 (Peace, Justice, and Strong Institutions). Agility requires not just systems, but also human-centered responsiveness. Policymakers need to champion internal governance instruments, leadership empowerment, and cross-functional collaboration as institutional agility drivers.

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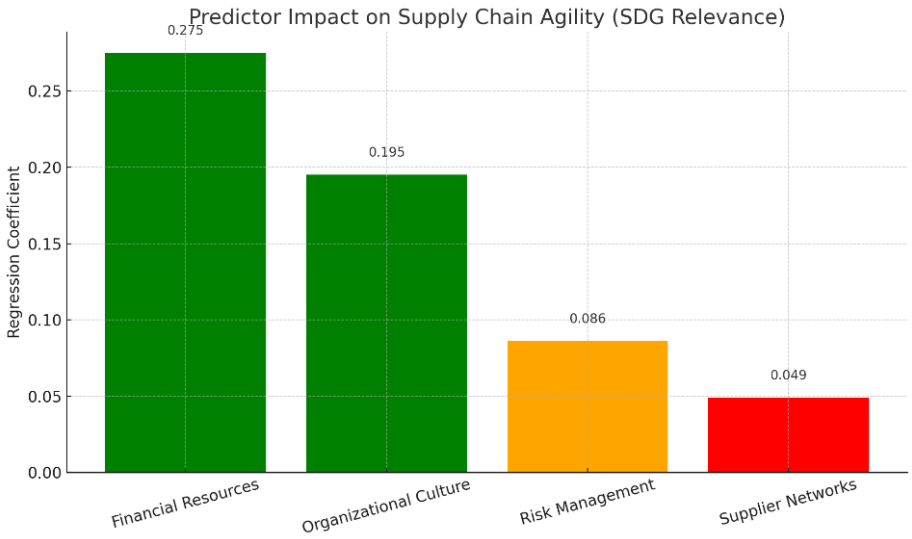

Figure 4. Predictor Impact for relevance to SDG on Supply Chain Agility

Risk Management indicates slight importance (β = 0.086) but plays an important function to support SDG 13 (Climate Action) and SDG 11 (Sustainable Cities and Communities). Though it is not an influential short-run indicator, it is necessary in enhancing long-term resistance to shocks. Incentives should be offered at national policies for climate risk audits, disaster preparedness education, and environmental intelligence integrated in supply chain policies. Supplier Networks (β = 0.049) was not a statistically significant but is strategically important for SDG 12 (Responsible Consumption and Production) and SDG 17 (Partnerships for the Goals). Policymakers and industry associations must push regional supplier integration, joint platforms, and digital sourcing infrastructure to increase its contribution.

1.9. Comparative Insights from Literature

This research's empirical findings support and add to the prevailing literature on supply chain agility, especially in SSIs and in post-disruption recovery. Most studies have stressed the significance of internal capabilities, including financial preparedness, cultural flexibility, and technological integration, in developing responsive supply chain actions. In line with the current study, Christopher and Peck (2004) also emphasized the important role played by financial resource stability in facilitating rapid recovery and adaptability during disturbances. This aligns with the fact that Financial Resources was found to be the strongest predictor of supply chain agility. In the same vein, Blome and Schoenherr (2011) also established that strong financial planning boosts resilience in procurement and production operations, especially among cash-strapped firms. The high impact of Organizational Culture in the present study also resonates with earlier studies by Braunscheidel and Suresh (2009), who had determined flexible leadership and employee empowerment to be central enablers of agile supply chain approaches. Cross-functional communication and a decentralized decision environment—both characteristic of agile culture—have also been underscored by Swafford et al. (2006). While Technology Adoption proved disparate importance in earlier research, present findings indicate increasing relevance in the post-COVID era. Scholars like Gunasekaran et al. (2017) have argued that digitalization involving real-time visibility, automation, and analytics greatly helps improve responsiveness in the supply chain, yet gaps in execution tend to limit its potential full effect in small businesses. Notably, Risk Management and Supplier Networks, although theoretically underpinned in the literature (Tang, 2006; Pettit et al., 2010), were not statistically significant to the same extent in this research. This can be attributed to the erratic implementation of formal risk practices and immature supplier ecosystems in SSIs, as argued by Kleindorfer and Saad (2005). Overall, the current study confirms the literature's acknowledgment of internal capabilities as fundamental to agility and, at the same time, identifies context-specific variations, specifically regarding how smaller firms implement these capabilities under

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conditions of constraint. This implies the necessity for context-based policy interventions as well as sector-specific frameworks of agility.

CONCLUSIONS

This research assessed interdependent factors that determine supply chain agility in small-scale industries (SSIs) with a focus on sustainable development alignment in the post-COVID-19 period. By merging statistical measures like Exploratory Factor Analysis, Cronbach's Alpha, and Multiple Regression Analysis, this work provided a robust empirical base to explore how organizational capabilities within influence agility outcomes. The findings indicated that Financial Resources, Organizational Culture, and Technology Adoption were major drivers of supply chain agility, with Financial Resources being the strongest predictor. These findings affirm the significance of financial solidity, transformational leadership, and digital preparedness in allowing companies to react appropriately to disruptions. While Risk Management had marginal statistical influence, its applicability to long-term resilience and climate adaptability was confirmed. Meanwhile, Supplier Networks and Sustainability did not have significant short-term impacts but are still of strategic importance, especially in regard to SDG 12 and SDG 17. The research also indicated how these business dimensions correspond with key Sustainable Development Goals (SDGs), which include SDG 8 (Decent Work), SDG 9 (Industry and Innovation), SDG 13 (Climate Action), and SDG 16 (Strong Institutions). This congruence offers a chance for policymakers to support agility-oriented interventions that concurrently support economic resilience and sustainability goals. To wrap up, supply chain agility in SSIs needs to be strengthened through a multi-faceted approach that combines financial inclusion, organizational flexibility, investment in technology, and policy-basin risk preparedness. To better understand sectoral differences and assess the changing dynamics of agility and sustainability in small-scale industrial ecosystems, future studies need to capture sectoral differences and utilize longitudinal data.

LIMITATIONS AND FUTURE RECOMMENDATIONS

Though this research provides insightful information on supply chain agility drivers and their congruence with Sustainable Development Goals (SDGs), it is not without its own set of limitations. For one, the study is founded on cross-sectional survey information, which limits causality inference. Longitudinal studies would enable us to gain a dynamic insight into how agility changes over time, especially regarding response to external shocks like pandemics or climate-related disruptions. Second, while the survey tool had strong internal consistency, very high Cronbach's Alpha scores indicate potential redundancy of items. Future versions should try to minimize overlapping items and use confirmatory factor analysis (CFA) to build stronger construct validity. Third, the research targets a synthetic and regionally representative small-scale industries sample. While it aids in generalizability to some degree, industry-specific situations (e.g., manufacturing as opposed to food processing) might produce differential agility drivers. Future studies can employ a sectoral perspective or carry out comparative case studies within and across regions and industry segments. Fourth, predictors like Sustainability and Supplier Networks failed to come up as statistically significant, although they are strategic priorities in the extant literature. This limitation can be traced back to differences in implementation maturity within firms. Future studies must investigate these constructs further using mixed methods techniques in order to unearth latent enablers or limitations. Finally, although the research investigated SDG alignment, it did not actually measure environmental or social impact results. Incorporating environmental performance metrics, carbon values, or community-level information could provide more comprehensive perspectives of sustainability performance tied to agility. In conclusion, future research must take more fine-grained, longitudinal, and impact-oriented perspectives to better understand agility in small-scale industries and further develop the SDG–performance nexus in international supply chains.

REFERENCES

[1] M. Christopher and H. Peck, "Building the resilient supply chain," 2004.
[2] P. R. Kleindorfer and G. H. Saad, "Managing disruption risks in supply chains," *Production and operations management,* vol. 14, no. 1, pp. 53-68, 2005.

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[3] P. M. Swafford, S. Ghosh, and N. Murthy, "The antecedents of supply chain agility of a firm: scale development and model testing," *Journal of Operations management,* vol. 24, no. 2, pp. 170-188, 2006.
[4] D. Gligor, M. Holcomb, M. J. Maloni, and E. Davis-Sramek, "Achieving financial performance in uncertain times: leveraging supply chain agility," *Transportation Journal,* vol. 58, no. 4, pp. 247-279, 2019.
[5] M. Irfan, M. Wang, and N. Akhtar, "Impact of IT capabilities on supply chain capabilities and organizational agility: a dynamic capability view," *Operations Management Research,* vol. 12, no. 3, pp. 113-128, 2019.
[6] A. A. A. Shukor, M. S. Newaz, M. K. Rahman, and A. Z. Taha, "Supply chain integration and its impact on supply chain agility and organizational flexibility in manufacturing firms," *International Journal of Emerging Markets,* vol. 16, no. 8, pp. 1721-1744, 2021.
[7] M. J. Braunscheidel and N. C. Suresh, "The organizational antecedents of a firm's supply chain agility for risk mitigation and response," *Journal of operations Management,* vol. 27, no. 2, pp. 119-140, 2009.
[8] T. J. Pettit, J. Fiksel, and K. L. Croxton, "Ensuring supply chain resilience: development of a conceptual framework," *Journal of business logistics,* vol. 31, no. 1, pp. 1-21, 2010.
[9] C. Blome and T. Schoenherr, "Supply chain risk management in financial crises—A multiple case-study approach," *International journal of production economics,* vol. 134, no. 1, pp. 43-57, 2011.
[10] B. X. Lee *et al.*, "Transforming our world: implementing the 2030 agenda through sustainable development goal indicators," *Journal of public health policy,* vol. 37, pp. 13-31, 2016.
[11] C. S. Tang, "Robust strategies for mitigating supply chain disruptions," *International Journal of Logistics: Research and Applications,* vol. 9, no. 1, pp. 33-45, 2006.
[12] R. T. Aldhaheri and S. Z. Ahmad, "Factors affecting organisations' supply chain agility and competitive capability," *Business Process Management Journal,* vol. 29, no. 2, pp. 505-527, 2023.
[13] R. R. Panigrahi, D. Jena, J. R. Meher, and A. K. Shrivastava, "Assessing the impact of supply chain agility on operational performances-a PLS-SEM approach," *Measuring Business Excellence,* vol. 27, no. 1, pp. 1-24, 2023.
[14] T. I. Butt, "Impact of Supply Chain Integration on Competitive Performance and Customer Satisfaction: Analysing the Role of Supply Chain Agility and Supply Chain Finance," 2024.
[15] C. Tufan, Ş. Çiğdem, Y. Kılıç, and G. Sayar, "Agility and Resilience in Supply Chains: Investigating Their Roles in Enhancing Financial Performance," *Sustainability,* vol. 16, no. 17, p. 7842, 2024.
[16] D. M. Gligor, C. L. Esmark, and M. C. Holcomb, "Performance outcomes of supply chain agility: when should you be agile?," *Journal of operations management,* vol. 33, pp. 71-82, 2015.
[17] A. Gunasekaran, N. Subramanian, and S. Rahman, "Supply chain resilience: role of complexities and strategies," vol. 53, ed: Taylor & Francis, 2015, pp. 6809-6819.
[18] G. Bargshady, S. M. Zahraee, M. Ahmadi, and A. Parto, "The effect of information technology on the agility of the supply chain in the Iranian power plant industry," *Journal of Manufacturing Technology Management,* vol. 27, no. 3, pp. 427-442, 2016.
[19] D. M. Gligor, "The role of supply chain agility in achieving supply chain fit," *Decision Sciences,* vol. 47, no. 3, pp. 524-553, 2016.
[20] B. Singh Patel, C. Samuel, and S. Sharma, "Evaluation of agility in supply chains: a case study of an Indian manufacturing organization," *Journal of Manufacturing Technology Management,* vol. 28, no. 2, pp. 212-231, 2017.
[21] M. S. S. Jajja, K. A. Chatha, and S. Farooq, "Impact of supply chain risk on agility performance: Mediating role of supply chain integration," *International journal of production economics,* vol. 205, pp. 118-138, 2018.
[22] K. Rafique, L. Kai, and A. Waheed, "Understanding the impact of agile supply chain on organizational financial performance," in *Proceedings of the 2018 2nd international conference on management engineering, software engineering and service sciences*, 2018, pp. 28-32.

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