

The Impact of Supply Chain Innovation and Market Collaboration on the Competitive Advantage of Agribusiness MSMEs in the Era of Digital Transformation

Donny Ivan Samuel Simatupang¹, Putu Fajar Kartika Lestari²

Fakultas Pertanian, Universitas Methodist Indonesia

Program Studi Agribisnis Universitas Mahasaraswati Denpasar

Article Info

Article history:

Received February, 2026

Revised February, 2026

Accepted February, 2026

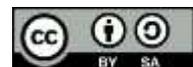
Keywords:

Supply Chain Innovation;
Market Collaboration;
Competitive Advantage;
Agribusiness MSMEs; Digital
Transformation

ABSTRACT

The era of digital transformation has created significant opportunities and challenges for agribusiness micro, small, and medium enterprises (MSMEs), particularly in strengthening their competitive advantage through innovation and collaboration. This study aims to analyze the impact of supply chain innovation and market collaboration on the competitive advantage of agribusiness MSMEs using a quantitative approach. Primary data were collected from 155 respondents through a structured questionnaire measured using a five-point Likert scale. Data analysis was conducted using SPSS version 25, including validity and reliability testing, classical assumption tests, and multiple linear regression analysis. The results indicate that supply chain innovation has a positive and significant effect on competitive advantage, while market collaboration also shows a significant positive influence. Simultaneously, both variables contribute significantly to competitive advantage with an R^2 value of 0.610, indicating that 61.0% of the variance in competitive advantage is explained by the model. These findings highlight the importance of integrating innovative supply chain practices and strengthening collaborative networks to enhance business performance in the digital era. The study provides practical implications for policymakers and agribusiness practitioners in designing strategies that promote digital adoption, partnership development, and sustainable competitiveness.

This is an open access article under the [CC BY-SA](#) license.



Corresponding Author:

Name: Donny Ivan Samuel Simatupang

Institution: Fakultas Pertanian, Universitas Methodist Indonesia

Email: donnyivan83@gmail.com

1. INTRODUCTION

The rapid advancement of digital technology has transformed the landscape of global agribusiness, creating new opportunities as well as challenges for micro, small, and medium enterprises (MSMEs). In the era of digital transformation, agribusiness MSMEs are no longer competing solely through traditional production capabilities, but also through their ability to integrate

innovation within supply chain processes and collaborate effectively with market actors [1], [2]. Digital platforms, data-driven decision-making, and interconnected distribution networks have reshaped how products move from producers to consumers. As a result, competitive advantage increasingly depends on how well businesses adapt to technological changes while maintaining operational efficiency and market responsiveness [3].

Agribusiness MSMEs play a strategic role in supporting food security, rural economic development, and employment generation, particularly in developing countries. Despite their importance, many of these enterprises face structural constraints such as limited access to information, fragmented supply chains, and weak collaboration networks. These limitations often hinder their capacity to compete in dynamic markets that demand speed, transparency, and innovation [4], [5]. Supply chain innovation, which includes digital logistics management, process optimization, and the adoption of smart technologies, has emerged as a critical factor that can improve performance and resilience. At the same time, market collaboration involving partnerships with suppliers, distributors, digital platforms, and other stakeholders enables MSMEs to access new knowledge, expand market reach, and reduce operational risks [6], [7].

Previous studies have highlighted the role of innovation and collaboration in enhancing business performance; however, empirical evidence focusing specifically on agribusiness MSMEs within the context of digital transformation remains limited. Much of the existing literature emphasizes large-scale enterprises or manufacturing sectors, leaving a gap in understanding how smaller agribusiness actors leverage supply chain innovation and collaborative strategies to achieve competitive advantage [1], [3], [4]. Furthermore, the integration of digital tools within traditional agricultural value chains introduces new dynamics that require quantitative investigation. Understanding these relationships is essential to formulate practical strategies that align technological adoption with market competitiveness.

Competitive advantage in agribusiness MSMEs is increasingly shaped by the ability to create value through efficiency, differentiation, and responsiveness to consumer demand. [8], [9] Digital transformation encourages businesses to adopt innovative supply chain practices such as real-time inventory monitoring, digital marketing integration, and collaborative planning with partners. These practices not

only enhance operational performance but also strengthen the strategic positioning of MSMEs in competitive markets.

Therefore, examining how supply chain innovation and market collaboration jointly influence competitive advantage becomes highly relevant for both academic discourse and practical application. Based on these considerations, this study aims to analyze the impact of supply chain innovation and market collaboration on the competitive advantage of agribusiness MSMEs using a quantitative approach. By collecting data from 155 respondents, this research seeks to provide empirical evidence regarding the significance of these factors in the context of digital transformation. The findings are expected to contribute to the development of strategic frameworks that support MSMEs in adapting to technological change while strengthening their market position, while also offering insights for policymakers and practitioners in designing initiatives that promote innovation-driven and collaborative ecosystems within the agribusiness sector.

2. LITERATURE REVIEW

2.1 *Supply Chain Innovation in the Digital Transformation Era*

Supply chain innovation refers to the implementation of new ideas, technologies, and processes that improve the efficiency, flexibility, and responsiveness of supply chain activities, particularly within the context of digital transformation where innovation goes beyond operational improvements to include the integration of digital platforms, automation, data analytics, and collaborative systems that enable real-time coordination among stakeholders [10], [11]. For agribusiness MSMEs, supply chain innovation may involve the adoption of digital logistics tracking, online procurement systems, or integrated inventory management tools that enhance

transparency and reduce uncertainty. The literature highlights that innovative supply chains allow businesses to respond more quickly to market fluctuations, minimize operational costs, and improve product quality, while digital transformation encourages MSMEs to move from fragmented traditional supply chains toward interconnected and data-driven networks [12], [13]. This shift is especially important in agribusiness, where seasonal production cycles, distribution challenges, and perishable products demand efficient coordination, making supply chain innovation a strategic capability that strengthens operational performance and supports long-term competitiveness.

2.2 Market Collaboration and Strategic Partnerships

Market collaboration refers to cooperative relationships among business actors such as suppliers, distributors, customers, and institutional partners aimed at achieving mutual benefits through information sharing, joint marketing, co-creation, or shared logistics. In the digital era, collaboration is increasingly supported by online marketplaces [14], [15], social media, and integrated communication technologies that reduce interaction barriers. Research shows that collaborative practices expand access to knowledge, strengthen trust, and broaden market reach, while enabling agribusiness MSMEs to pool resources and solve problems collectively [16], [17]. Strategically, market

collaboration helps reduce transaction costs, accelerates innovation diffusion, and enhances adaptability in dynamic environments, thereby reinforcing competitive advantage.

2.3 Competitive Advantage in Agribusiness MSMEs

Competitive advantage represents a firm's ability to outperform competitors through superior value creation, cost efficiency, differentiation, and responsiveness to customer needs, which in agribusiness MSMEs often arises from product quality, efficient distribution, and strong stakeholder relationships. Digital transformation has broadened the dimensions of competitiveness by emphasizing technological capability, digital marketing effectiveness, and supply chain agility [18]. Scholars highlight that competitive advantage is not only shaped by internal resources but also by the ability to integrate external knowledge and collaborate with partners. In agribusiness contexts, innovation in production and distribution helps reduce waste and improve consistency [3], [19], while collaboration enhances market visibility and customer engagement, making competitive advantage a dynamic outcome influenced by innovation and inter-organizational relationships.

2.4 Digital Transformation and MSME Development

Digital transformation refers to the integration of digital technologies into business processes, organizational culture, and customer engagement

strategies, enabling MSMEs to overcome geographical limitations, expand market access, and improve decision-making through data analytics [20], [21]. Although the adoption of digital tools requires changes in mindset, skills, and technological investment, the literature emphasizes that digital transformation acts as an enabling environment that strengthens the impact of supply chain innovation and market collaboration. Digital platforms support faster information exchange, automate routine activities, and enhance coordination among stakeholders, while in agribusiness MSMEs they facilitate traceability [21], online sales, and digital payment systems that collectively improve competitiveness and business sustainability.

2.5 Conceptual Framework and Hypothesis Development

Based on the theoretical discussion, this study proposes that supply chain innovation and market collaboration act as key determinants of competitive advantage in agribusiness MSMEs within the context of digital transformation. Supply chain innovation is expected to improve efficiency, adaptability, and product value, thereby strengthening competitiveness, while market collaboration is anticipated to expand access to resources, information, and market opportunities that positively influence competitive outcomes. Accordingly, the following hypotheses are formulated:

- H1: Supply chain innovation has a positive and significant effect on

the competitive advantage of agribusiness MSMEs.

- H2: Market collaboration has a positive and significant effect on the competitive advantage of agribusiness MSMEs.
- H3: Supply chain innovation and market collaboration simultaneously influence the competitive advantage of agribusiness MSMEs in the era of digital transformation.

3. RESEARCH METHODS

3.1 Research Design

This study employs a quantitative research design to examine the influence of supply chain innovation and market collaboration on the competitive advantage of agribusiness MSMEs in the era of digital transformation. A quantitative approach was selected because it allows the measurement of relationships among variables through statistical analysis and provides objective empirical evidence. The research uses a cross-sectional survey method, where data were collected at a single point in time to capture the perceptions and experiences of agribusiness MSME actors regarding innovation practices, collaborative activities, and competitive performance.

3.2 Population and Sample

The population of this study consists of agribusiness MSMEs that actively engage in production, processing, or distribution activities and have adopted or interacted with digital technologies in their business processes. The sampling technique applied is purposive sampling, with specific criteria including: (1) MSMEs operating within the agribusiness sector, (2) business owners or managers directly involved in supply chain decision-making, and (3) enterprises that have experience with digital platforms or collaborative market activities. Based on these criteria, a total of 155 respondents were selected as the research sample. This sample size is considered adequate for statistical analysis using multiple regression techniques.

3.3 Data Collection Technique

Primary data were collected through a structured questionnaire distributed to respondents both online and offline. The questionnaire was designed to measure perceptions related to supply chain innovation, market collaboration, and competitive advantage. Each statement item was evaluated using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The use of a Likert scale enables the quantification of subjective perceptions into measurable data suitable for statistical testing. Prior to distribution, the questionnaire underwent a preliminary review to ensure clarity, relevance, and alignment with research objectives.

3.4 Research Variables and Operational Definitions

This study involves one dependent variable and two independent variables, where competitive advantage serves as the dependent variable reflecting the ability of agribusiness MSMEs to achieve superior performance through efficiency, differentiation, and market responsiveness, while supply chain innovation and market collaboration function as the independent variables. Supply chain innovation refers to the implementation of new processes, technologies, or management practices that enhance efficiency, flexibility, and integration within the supply chain, including indicators such as digital logistics adoption, process optimization, information sharing, and responsiveness to market changes. Market collaboration represents cooperative relationships with stakeholders such as suppliers, distributors, customers, and digital platforms aimed at strengthening value creation and market access, measured through partnership intensity, communication quality, joint problem-solving, and collaborative marketing efforts. Meanwhile, competitive advantage is assessed through operational efficiency, product differentiation, customer satisfaction, and adaptability to digital transformation.

3.5 Instrument Testing

To ensure the quality of the research instrument, validity and reliability tests were conducted using SPSS version 25. The validity test was performed using the Pearson product-moment correlation to determine whether each questionnaire item accurately represents the intended construct. Items with correlation coefficients exceeding the critical value were considered valid. Reliability testing employed Cronbach's alpha coefficient to evaluate the internal consistency of each variable. A Cronbach's alpha value greater than 0.70 indicates that the measurement instrument is reliable and suitable for further analysis.

3.6 Data Analysis Technique

Data analysis was conducted using SPSS version 25 through several stages, beginning with descriptive statistical analysis to describe respondent characteristics and the distribution of research variables, followed by classical assumption tests including normality, multicollinearity, and heteroscedasticity to ensure the data met regression requirements. Multiple linear regression analysis was then applied to examine the effect of supply chain innovation and market collaboration on competitive advantage, while hypothesis testing used t-tests to assess partial effects and F-tests to evaluate simultaneous effects of the independent variables on the dependent variable. In addition, the coefficient of determination (R^2) was calculated to measure the extent to which the independent variables explain variations in competitive advantage, with statistical significance determined at a 0.05 level.

4. RESULTS AND DISCUSSION

4.1 Respondent Results

The respondent analysis was conducted to describe the demographic and business characteristics of agribusiness MSME actors involved in this study, with a total of 155 respondents participating. Based on gender, male respondents slightly dominated at 56.1% (87 individuals), while female respondents accounted for 43.9% (68

individuals), indicating inclusive participation within the sector. In terms of age, most respondents were in the 31–40-year group (36.8%), followed by 41–50 years (25.2%), 20–30 years (24.5%), and above 50 years (13.5%), suggesting that the businesses are largely managed by individuals in productive working ages who tend to adopt digital innovation. Regarding education level, 40.0% had a high school background, 33.5% held bachelor's degrees, 18.1% diplomas, and 8.4% postgraduate degrees, reflecting varied educational profiles that may influence openness to digital transformation. Business experience shows that 47.7% of respondents had operated for 3–7 years, 32.9% for more than 7 years, and 19.4% for less than 3 years, indicating a balance between experience and adaptability. Based on sector classification, food processing dominated with 33.5%, followed by crop production (29.7%),

distribution or trading (18.7%), and livestock (18.1%), highlighting the importance of value-added activities in agribusiness MSMEs. Furthermore, digital technology adoption indicates that 36.8% of respondents had intermediate-level adoption such as online marketplaces and digital payments, while 31.6% were at both basic and advanced levels, meaning that 68.4% had adopted at least intermediate digital tools, providing a strong foundation for implementing supply chain innovation and collaborative market strategies.

4.2 Descriptive Statistics

Descriptive analysis was conducted to examine the overall distribution of each research variable. The results show that respondents generally perceived supply chain innovation and market collaboration positively.

Table 1. Descriptive Statistics of Research Variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Supply Chain Innovation (X1)	155	2.60	4.95	4.12	0.51
Market Collaboration (X2)	155	2.75	4.90	4.05	0.56
Competitive Advantage (Y)	155	2.80	5.00	4.18	0.49

The descriptive statistics indicate that all research variables have relatively high mean values, reflecting positive perceptions among agribusiness MSME respondents toward innovation, collaboration, and competitive performance. Supply chain innovation shows a mean score of 4.12 with a standard deviation of 0.51, suggesting that most respondents perceive their businesses as actively implementing innovative practices with relatively consistent responses. Market collaboration has a mean value of 4.05 and a standard deviation of 0.56, indicating strong engagement in cooperative activities, although slightly more varied compared to supply chain innovation. Meanwhile, competitive advantage records the highest mean at 4.18 with a standard deviation of 0.49, implying that respondents generally view

their businesses as having a strong competitive position. The relatively narrow standard deviation across variables also demonstrates stable response patterns, reinforcing the assumption that agribusiness MSMEs are increasingly adopting innovation and collaboration strategies to enhance competitiveness in the digital transformation era.

4.3 Instrument Testing

Validity Test

All questionnaire items showed Pearson correlation values ranging between 0.521–0.812, exceeding the r-table value of 0.157 ($n = 155$, $\alpha = 0.05$). Therefore, all items were declared valid.

Reliability Test

Table 2. Reliability Test Results

Variable	Cronbach's Alpha	Standard	Conclusion
Supply Chain Innovation	0.874	>0.70	Reliable
Market Collaboration	0.861	>0.70	Reliable
Competitive Advantage	0.889	>0.70	Reliable

The reliability test results demonstrate that all research variables meet the required internal consistency standards, as indicated by Cronbach's Alpha values exceeding the threshold of 0.70. Supply chain innovation shows a Cronbach's Alpha value of 0.874, market collaboration records 0.861, and competitive advantage achieves the highest reliability with a value of 0.889, indicating that the measurement items for each construct are consistent and stable. These findings confirm that the questionnaire instrument is reliable for capturing respondents' perceptions and can be used confidently for further statistical analysis. The high reliability values also suggest that the indicators used to measure innovation practices, collaborative relationships, and competitive performance are well-structured and capable of producing dependable research outcomes.

4.4 Classical Assumption Tests

Normality Test

The normality test was conducted to determine whether the regression residuals were normally distributed using the Kolmogorov-Smirnov (K-S) test. The results show that the unstandardized residuals from 155 observations produced an Asymp. Sig. (2-tailed) value of 0.086, which is greater than the standard threshold of 0.05, indicating that the residual data are normally distributed. This finding confirms that the normality assumption required for regression analysis has been fulfilled, suggesting that the model estimation is statistically appropriate and not affected by bias arising from abnormal data distribution.

Multicollinearity Test

The multicollinearity test evaluates whether there is a strong correlation among independent variables that could distort regression results. This test was conducted using Tolerance and Variance Inflation Factor (VIF) values.

Table 3. Multicollinearity Test Results

Independent Variable	Tolerance	VIF	Standard	Conclusion
Supply Chain Innovation (X1)	0.641	1.561	Tolerance > 0.10; VIF < 10	No Multicollinearity
Market Collaboration (X2)	0.641	1.561	Tolerance > 0.10; VIF < 10	No Multicollinearity

The multicollinearity test results indicate that both independent variables meet the required statistical standards, with tolerance values of 0.641 exceeding the minimum threshold of 0.10 and VIF values of 1.561 remaining well below the maximum limit of 10. These findings confirm that there is no strong correlation between supply chain innovation and market collaboration, meaning that each variable contributes independently to explaining competitive advantage within the regression model. The

absence of multicollinearity ensures that the regression coefficients are stable and reliable, allowing for accurate interpretation of the individual effects of innovation and collaboration on the competitiveness of agribusiness MSMEs.

Heteroscedasticity Test

The heteroscedasticity test examines whether the variance of residuals remains constant across different levels of independent variables. The Glejser test was applied in this study.

Table 4. Heteroscedasticity Test Results (Glejser Test)

Independent Variable	Sig. Value	Standard	Conclusion
Supply Chain Innovation (X1)	0.274	> 0.05	No Heteroscedasticity
Market Collaboration (X2)	0.318	> 0.05	No Heteroscedasticity

The heteroscedasticity test using the Glejser method shows that both independent variables meet the required statistical criteria, with significance values of 0.274 for supply chain innovation and 0.318 for market collaboration, each exceeding the standard threshold of 0.05. These results indicate that the variance of residuals remains consistent across different levels of the independent variables, confirming the absence of heteroscedasticity in the regression model. Consequently, the model demonstrates stable

error variance, ensuring that the parameter estimates are reliable and that the regression analysis can be interpreted with confidence in examining the influence of innovation and collaboration on the competitive advantage of agribusiness MSMEs.

4.5 Multiple Linear Regression Analysis

The regression analysis was conducted to evaluate the influence of supply chain innovation and market collaboration on competitive advantage.

Table 5. Multiple Linear Regression Results

Variable	Unstandardized B	Std. Error	Beta	t-value	Sig.
Constant	0.842	0.341	—	2.468	0.015
Supply Chain Innovation (X1)	0.417	0.072	0.456	5.792	0.000
Market Collaboration (X2)	0.365	0.069	0.401	5.297	0.000

Regression Equation:

$$Y = 0.842 + 0.417X1 + 0.365X2$$

The regression results indicate that both independent variables have a positive and significant influence on competitive advantage, with supply chain innovation showing the strongest standardized beta value of 0.456, suggesting a more dominant role compared to market collaboration. The partial hypothesis testing through the t-test confirms that supply chain innovation has a t-value of 5.792 with a significance level of

0.000, indicating that H1 is supported, while market collaboration records a t-value of 5.297 with a significance level of 0.000, confirming support for H2. Furthermore, the simultaneous effect tested through the F-test demonstrates that both variables collectively contribute significantly to explaining competitive advantage, reinforcing the importance of integrating innovation and collaborative strategies within agribusiness MSMEs.

Table 6. ANOVA Test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	22.681	2	11.341	120.243	0.000
Residual	14.341	152	0.094		
Total	37.022	154			

The ANOVA test results indicate that the regression model is statistically significant and appropriate for explaining the relationship between the independent and dependent variables, as shown by the regression sum of squares of 22.681 compared

to the residual sum of squares of 14.341, which reflects that a substantial portion of the variation in competitive advantage is explained by supply chain innovation and market collaboration. The F-value of 120.243 with a significance level of 0.000, which is far

below the 0.05 threshold, confirms that both independent variables simultaneously have a significant effect on competitive advantage, demonstrating strong explanatory power of the model. Therefore, these findings support the assumption that innovation and collaboration strategies collectively enhance the competitiveness of agribusiness MSMEs, and hypothesis H3 is accepted.

The coefficient of determination results show an R value of 0.781 with an R Square of 0.610 and an Adjusted R Square of 0.605, along with a standard error of 0.307, indicating that the regression model has a strong explanatory capacity. The R² value of 0.610 means that 61.0% of the variation in competitive advantage can be explained by supply chain innovation and market collaboration, while the remaining 39.0% is influenced by other variables outside the scope of this study, suggesting that innovation and collaboration play a substantial role in shaping the competitiveness of agribusiness MSMEs.

4.6 Discussion

The findings demonstrate that supply chain innovation significantly enhances the competitive advantage of agribusiness MSMEs. The strong regression coefficient indicates that businesses adopting digital logistics systems, efficient inventory management, and innovative distribution strategies tend to achieve improved performance outcomes. In the context of digital transformation, innovation enables MSMEs to minimize operational inefficiencies, improve responsiveness to market changes, and strengthen their strategic positioning. This supports the view that innovation capability functions as a strategic resource that enhances organizational adaptability and long-term sustainability [1], [2].

Market collaboration also shows a significant positive influence on competitive advantage. Through collaborative relationships, MSMEs gain access to wider business networks, exchange valuable market information, and conduct joint promotional activities that improve business resilience [3],

[4]. Digital platforms further facilitate communication and coordination among stakeholders, allowing agribusiness MSMEs to overcome traditional transactional barriers. These collaborative practices not only enhance market visibility but also encourage knowledge sharing that supports innovation and continuous improvement.

The simultaneous influence of supply chain innovation and market collaboration suggests that competitive advantage is shaped by both internal capabilities and external partnerships. The relatively high R² value of 61.0% confirms that innovation and collaboration together form a strong foundation for competitiveness within the agribusiness sector. MSMEs that successfully integrate digital tools into their supply chains while maintaining effective collaborative networks are more likely to achieve sustained growth, differentiation, and resilience in dynamic markets, highlighting the importance of combining technological advancement with strategic cooperation in the digital transformation era.

5. CONCLUSION

This study confirms that supply chain innovation and market collaboration play a crucial role in enhancing the competitive advantage of agribusiness MSMEs in the era of digital transformation. The quantitative findings demonstrate that innovative supply chain practices significantly improve operational efficiency, responsiveness to market changes, and strategic differentiation, making them a dominant factor influencing competitiveness. In addition, market collaboration strengthens partnerships, expands access to resources and information, and supports collective value creation, which further enhances business resilience. The simultaneous influence of both variables indicates that competitive advantage is shaped by the integration of internal innovation capabilities and external collaborative relationships. With a coefficient of determination of 61.0%, the results emphasize that digital-oriented innovation and collaboration strategies provide a strong foundation for MSMEs to adapt to evolving

market dynamics. Therefore, agribusiness MSMEs are encouraged to invest in digital supply chain solutions while fostering

collaborative ecosystems to sustain long-term competitiveness and growth.

REFERENCES

- [1] K. A. Goyal and P. Sharma, "A Flashback of MSME in India: Role in Employment Generation," *Pacific Bus. Rev. Int.*, vol. 12, no. 12, pp. 107–114, 2020, doi: 10.35629/5252-05021924.
- [2] P. S. Aithal and K. R. S. Sharma, "Role of MUDRA in Promoting SMEs/MSE, MSMEs, and Allied Agriculture Sector in the Rural and Urban Area-To Achieve 5 Trillion Economy," 2022.
- [3] R. Alviany, M. M. Mahyuddin, S. SN, and A. RA, "The Influence Of Entrepreneurial Orientation, Innovation And Marketing Strategies To Competitiveness Of Food Sector Msmes In Makassar," *Am. J. Sustainable Agric.*, vol. 13, no. 2, pp. 61–67, 2019.
- [4] E. Herissuparman, M. Ismane, H. Ashari, and S. S., "MSMEs and Rural Prosperity: A Study of their Influence in Indonesian Agriculture and Rural Economy," *Int. J. Innov. Sci. Res. Technol.*, Jun. 2024, doi: 10.38124/ijisrt/IJISRT24JUN1227.
- [5] N. E. Putri, F. Lestari, and R. M. Faris, "Implementing Green Logistics in Agricultural MSMEs in Sukabumi, West Java, Indonesia: Its Impact on Operational Efficiency and Environmental Sustainability," *CAKRAWALA Manag. Sci. J.*, vol. 2, no. 3, pp. 44–57, 2025.
- [6] H. Nguyen, T. L. Mai, T. T. T. Pham, and D. Binh, "Supply chain coordination in sustainable agribusiness development: an investigation from coffee exporters," *J. Agribus. Dev. Emerg. Econ.*, 2023.
- [7] S. Widiyanesti and Y. Fernando, "A Review of Supply Chain Risk Management in Agribusiness Industry," *Adv. Methodol. Technol. Bus. Oper. Manag.*, pp. 1225–1235, 2019.
- [8] L. Warlina, E. Soeryanto Soegoto, S. Supatmi, D. Oktafiani, and R. Jatnika, "Regional competitive advantage of agriculture as the leading sector in Garut Regency, West Java province, Indonesia," *J. East. Eur. Cent. Asian Res.*, vol. 10, no. 1, 2023.
- [9] H. Gharbi, A. E. E. Sobaih, N. Aliane, and A. Almubarak, "The Role of Innovation Capacities in the Relationship between Green Human Resource Management and Competitive Advantage in the Saudi Food Industry: Does Gender of Entrepreneurs Really Matter?," *Agriculture*, vol. 12, no. 6, p. 857, 2022.
- [10] V. D. Nguyen, T. C. Pham, C. H. Le, T. T. Huynh, T. H. Le, and M. Packianather, "An innovative and smart agriculture platform for improving the coffee value chain and supply chain," in *Machine Learning and Mechanics Based Soft Computing Applications*, Springer, 2023, pp. 185–197.
- [11] U. Lutfiyah, A. Purwani, and U. A. Dahlan, "The Blockchain Technology Architectures to Improve the Value Creation of Crop Agriculture Supply Chain in Indonesia: A Literature-Based Overview," pp. 2386–2400, 2023, doi: 10.46254/ap03.20220395.
- [12] M. D. Borah, V. B. Naik, R. Patgiri, A. Bhargav, B. Phukan, and S. G. M. Basani, "Supply chain management in agriculture using blockchain and IoT," *Adv. Appl. blockchain Technol.*, pp. 227–242, 2020.
- [13] G. Zhao *et al.*, "Modelling enablers for building agri-food supply chain resilience: insights from a comparative analysis of Argentina and France," *Prod. Plan. Control*, vol. 35, no. 3, pp. 283–307, 2024, doi: 10.1080/09537287.2022.2078246.
- [14] A. Kononiuk and A. Magruk, "BUILDING RESILIENCE IN EUROPEAN FOOD SUPPLY CHAINS: RESULTS OF A DELPHI STUDY," *Econ. Environ.*, vol. 87, no. 4, 2023, doi: 10.34659/eis.2023.87.4.758.
- [15] J. Hadachek, M. Ma, and R. J. Sexton, "Market structure and resilience of food supply chains under extreme events," *Am. J. Agric. Econ.*, vol. 106, no. 1, pp. 21–44, 2024, doi: 10.1111/ajae.12393.
- [16] A. H. A. Mohamed, B. C. Menezes, and T. AL-Ansari, "Interplaying of food supply chain resilience, industry 4.0 and sustainability in the poultry market," in *Computer Aided Chemical Engineering*, vol. 50, Division of Engineering Management and Decision Sciences, College of Science and Engineering, Hamad Bin Khalifa University, Doha, Qatar Foundation, Qatar: Elsevier B.V., 2021, pp. 1815–1820. doi: 10.1016/B978-0-323-88506-5.50281-3.
- [17] J. Li, Z. Li, Z. Shi, and H. Geng, "Examining the dynamic and nonlinear impacts of public health events on the resilience of food supply chain: evidence from China," *Front. Sustain. Food Syst.*, vol. 8, 2024, doi: 10.3389/fsufs.2024.1347594.
- [18] I. Khomah, N. Setyowati, M. Harisudin, R. K. Adi, and A. Qonita, "The factors contributing to the sustainability of agribusiness MSMEs in Sukoharjo Regency during the Covid-19 pandemic," in *IOP Conference Series: Earth and Environmental Science*, IOP Publishing, 2021, p. 12013.
- [19] E. Kashina *et al.*, "Impact of Digital Farming on Sustainable Development and Planning in Agriculture and Increasing the Competitiveness of the Agricultural Business.," *Int. J. Sustain. Dev. Plan.*, vol. 17, no. 8, 2022.

-
- [20] A. M. Ciruela-Lorenzo, A. R. Del-Aguila-Obra, and ..., "Digitalization of agri-cooperatives in the smart agriculture context. proposal of a digital diagnosis tool," *Sustainability*, 2020.
- [21] T. Qin, L. Wang, Y. Zhou, L. Guo, G. Jiang, and L. Zhang, "Digital technology-and-services-driven sustainable transformation of agriculture: Cases of China and the EU," *Agriculture*. mdpi.com, 2022.