

Bridging Local Wisdom and Generative AI through University-Industry Co-Creation: A Pathway to Green Innovation and Sustainable Growth of Indonesian MSMEs

1st Ika Novaliana, Prasetya Tri Mahendra¹, 2nd Muhammad Ali Lutfi², 3rd Suwandi³

ikanovaliana@upms.ac.id

Universitas PGRI Mpu Sindok ^(1,2,3)

Abstract. Integrating local wisdom with generative artificial intelligence (GenAI) offers new opportunities for MSMEs to strengthen innovation while preserving local identity and advancing sustainability. This study examines how local wisdom integration and GenAI capability influence green innovation and sustainable MSME growth through university-industry co-creation. A quantitative cross-sectional design is proposed using survey data from Indonesian MSME owners and managers, analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM). The study is expected to show that local wisdom integration and GenAI capability positively enhance university and industry co-creation, which subsequently promotes green innovation and sustainable business growth. Green innovation is also expected to mediate the relationship between co-creation and sustainable growth. The proposed framework highlights the strategic value of combining indigenous knowledge, GenAI, and university-industry collaboration to support innovation-driven and sustainable MSME development.

Keywords: Local wisdom; Generative AI; University-industry co-creation; Green innovation; Sustainable MSME growth.

1 Introduction

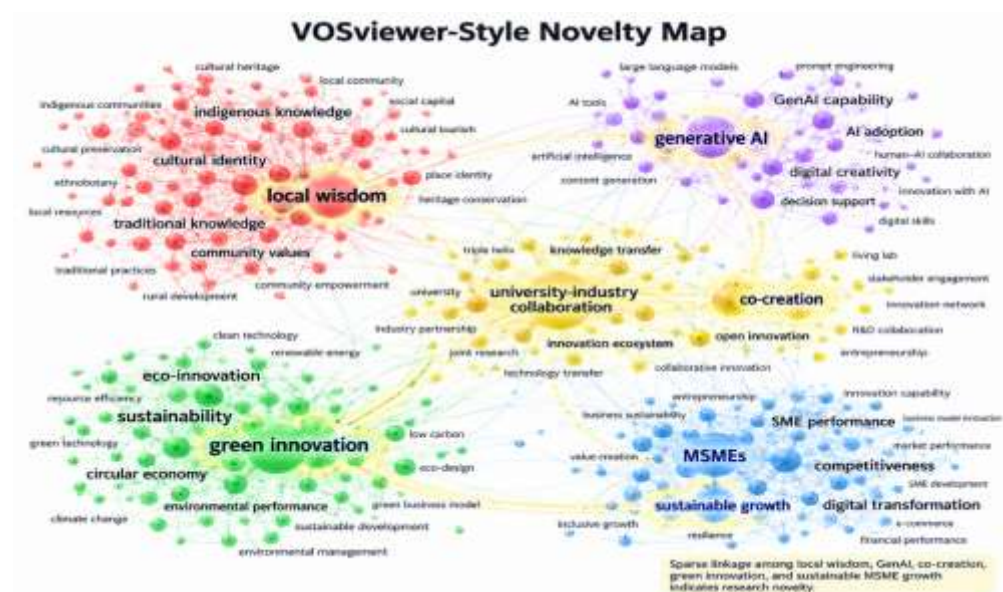
Micro, small, and medium enterprises (MSMEs) increasingly operate under two simultaneous pressures: accelerating digital transformation and rising expectations for environmentally and socially sustainable business practices. Recent studies show that digitalisation can strengthen sustainable innovation and organizational performance, while green innovation can improve the economic, environmental, and competitive outcomes of SMEs [1, 2]. At the same time, generative artificial intelligence (GenAI) is becoming increasingly relevant to resource-constrained SMEs, offering opportunities to enhance creativity, decision-making, operational efficiency, and sustainable product development [3, 4]

However, the rapid adoption of digital technologies may create a strategic tension for culturally embedded MSMEs. Competitive upgrading through GenAI can encourage increasingly technology-driven business practices, whereas local wisdom represents context-specific knowledge, values, production traditions, and community relationships that may differentiate MSMEs and sustain cultural identity. Evidence from Indonesian batik MSMEs indicates that local wisdom can stimulate green product and process innovation and strengthen green competitive advantage [5]. This suggests that tradition and technological advancement need not be competing forces; instead, their integration may constitute a distinctive capability for sustainable value creation.

Table 1. presenting the three key current phenomena/research problems that can be inserted directly into the Introduction or Research Gap section.

No.	Current Phenomenon / Research Problem	Previous Theory / Research Findings	Research Gap
1	The use of Generative AI among MSMEs is increasing, but it is mainly focused on efficiency, creativity, marketing, and productivity, while its integration with local values and indigenous knowledge remains limited.	[6]Fateh Zaiter found that Generative AI can help SMEs improve creativity, innovation, process efficiency, and competitiveness.	There is still limited understanding of how GenAI can be adopted without weakening local identity and local wisdom, and how both can function as complementary strategic resources.
2	Local wisdom has strong potential to support MSME sustainability, yet it has not been optimally combined with digital technologies and AI to generate green innovation.	[7] Mahendra demonstrated that local wisdom positively influences green product innovation, green process innovation, and green competitive advantage among batik MSMEs.	Previous studies have mainly examined the relationship between local wisdom and green innovation, but rarely integrate GenAI capability into the same framework for sustainable MSME development.
3	University–MSME collaboration is expanding, but its benefits do not always translate directly into sustainable business outcomes; an effective mechanism is needed to transform knowledge and technology into valuable innovation.	Lu [8] showed that university–SME collaboration can enhance environmental innovation adoption and digital/AI learning capabilities, which subsequently contribute to SME performance.	Few studies position university–industry co-creation as a bridging mechanism linking local wisdom and GenAI capability with green innovation and sustainable MSME growth.

Despite these developments, the literature remains fragmented. Studies on GenAI in SMEs predominantly examine technological opportunities, adoption, organizational requirements, and sustainability applications [9] and [10], while green innovation research generally emphasizes digitalisation, stakeholder pressure, dynamic capabilities, and sustainable performance [11]. Research on university–industry collaboration demonstrates that co-creation facilitates knowledge exchange and innovation, and recent evidence shows that university–SME collaboration can strengthen environmental innovation and digital/AI learning capabilities. Yet the mechanism connecting local wisdom, GenAI capability, university–industry co-creation, green innovation, and sustainable MSME growth remains underexplored, particularly in emerging economies.



Accordingly, this study asks: How do local wisdom integration and GenAI capability contribute to sustainable MSME growth through university–industry co-creation and green innovation? The study aims to develop and empirically test an integrated model linking these constructs among Indonesian MSMEs. Its novelty lies in positioning local wisdom and GenAI as complementary knowledge resources, while university–industry co-creation functions as a bridging mechanism that transforms these resources into green innovation and sustainable growth. The study contributes theoretically by extending dynamic-capability and co-creation perspectives into a culturally embedded AI context, empirically by testing an integrated pathway that has rarely been examined, and practically by offering universities, MSME managers, and policymakers a framework for developing culturally grounded, digitally enabled, and environmentally sustainable innovation ecosystems.

2. Literature Review

2.1. Dynamic Capabilities Theory

Dynamic Capabilities Theory (DCT) provides the primary theoretical foundation for this study. DCT explains how firms respond to rapidly changing environments through three interrelated capabilities: sensing opportunities and threats, seizing opportunities by mobilizing resources, and transforming existing resources and competencies. Recent evidence shows that dynamic capabilities enable SMEs to convert digitalization, knowledge, and innovation resources into sustainable performance, particularly under technological and environmental turbulence [12] and [13]. In this study, local wisdom and GenAI capability represent strategic knowledge resources, university–industry co-creation facilitates resource recombination, green innovation reflects resource transformation, and sustainable MSME growth constitutes the resulting long-term performance.

2.2. Local Wisdom Integration

Local wisdom integration refers to an MSME's capability to incorporate indigenous knowledge, cultural values, traditional practices, community relationships, and local identity into business strategies, products, and processes. Rather than being merely cultural heritage, local wisdom may constitute a distinctive strategic resource that supports differentiation and environmentally responsible innovation. Evidence from Indonesian batik MSMEs demonstrates that local wisdom enhances green product and process innovation and strengthens green competitive advantage [7].

2.3. Generative AI Capability

Generative AI capability represents a firm's ability to understand, acquire, integrate, govern, and strategically utilize GenAI technologies for business activities. GenAI can enhance creativity, knowledge accessibility, decision-making, operational efficiency, and innovation among resource-constrained SMEs. More recent studies associate GenAI with sustainable business practices and green innovation, suggesting that value arises not merely from AI adoption but from firms' capabilities to deploy it strategically [14].

2.4. University–Industry Co-Creation

University–industry co-creation refers to the collaborative development, exchange, and application of knowledge between universities and firms through research, training, technology transfer, experimentation, and joint problem-solving. Such collaboration expands access to external expertise and facilitates knowledge recombination. Recent SME evidence further indicates that university collaboration enhances environmental innovation and digital/AI learning capabilities [8].

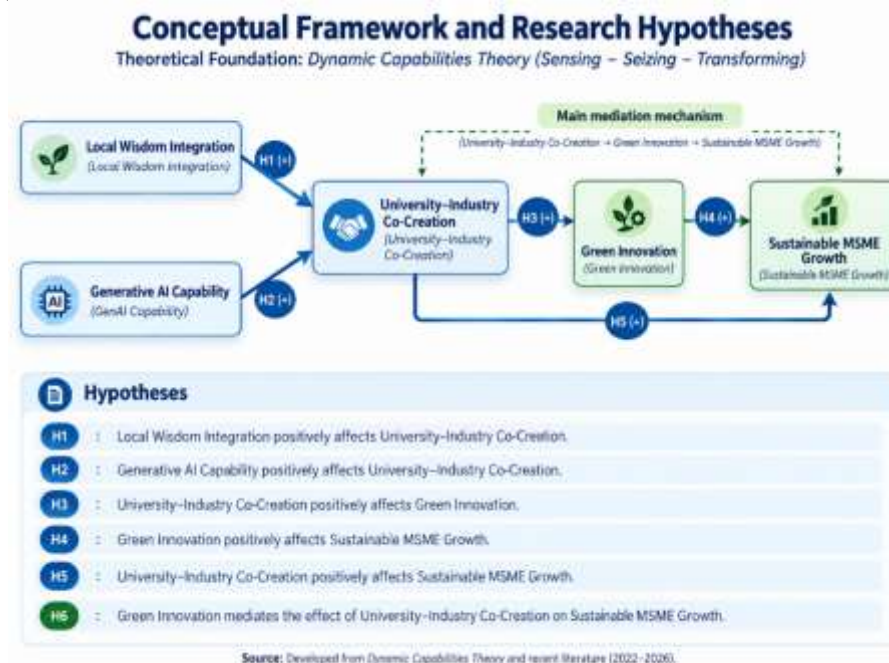
2.5. Green Innovation

Green innovation encompasses new or improved products, processes, technologies, and business practices that reduce environmental impacts while generating business value. Studies consistently associate eco-innovation with SME sustainable performance, while digital and dynamic capabilities facilitate the conversion of technological resources into green innovation outcomes [11].

2.6. Sustainable MSME Growth

Sustainable MSME growth refers to sustained business development that simultaneously maintains economic viability, competitiveness, resilience, and environmental and social value creation. It therefore extends beyond short-term sales or profit growth. Contemporary evidence

suggests that digitalization, innovation, and sustainability strategies jointly contribute to SMEs' long-term growth and sustainable performance [15].



3. Research Method

3.1. Research Design

This study employs a quantitative, cross-sectional, and explanatory research design to empirically examine the relationships among Local Wisdom Integration, Generative AI Capability, University–Industry Co-Creation, Green Innovation, and Sustainable MSME Growth [16]. A quantitative approach is appropriate because the proposed hypotheses require the estimation of direct and indirect relationships among multiple latent constructs. PLS-SEM is particularly suitable for prediction-oriented research involving complex structural models and mediation effects [17]; [18].

3.2. Population and Sample

The population consists of owners and managers of Indonesian MSMEs who are directly involved in strategic business decisions and have experience using digital technologies, including Generative AI. The study targets 300 respondents, selected through purposive sampling [19]. Respondents must have operated their businesses for at least two years and have knowledge of their firms' innovation and sustainability practices. A sample of approximately 300 respondents is considered adequate for PLS-SEM and is consistent with recent MSME studies employing samples of 324 and 345 firms.

3.3. Data Collection

Data will be collected using three complementary sources. First, a structured questionnaire using a five-point Likert scale will measure all research constructs. Second, brief interviews with selected MSME owners/managers and university partners will provide contextual information and support questionnaire interpretation. Third, secondary data from government reports, official statistics, policy documents, and relevant institutional publications will describe the broader MSME, digitalization, and sustainability context. Multi-source evidence is useful for understanding the heterogeneous characteristics of MSMEs [20].

3.4. Data Analysis

The analysis consists of descriptive analysis and Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS. Descriptive analysis summarizes respondent and business characteristics. The measurement model will assess indicator reliability, composite reliability, AVE, and discriminant validity. The structural model will examine path coefficients, R^2 , effect sizes, predictive relevance, and hypothesis significance using bootstrapping. The

mediating effect of Green Innovation will be assessed through specific indirect effects, while robustness procedures follow Arrosyid et.al [21].

4. Results and Discussion

4.1. Results

A total of **300 valid questionnaires** were analyzed. Respondents were MSME owners or managers who had operated their businesses for at least two years and were involved in strategic decision-making. The descriptive results indicate that respondents represented diverse business sectors and generally had experience with digital technologies and university-related collaboration.

Table 2. Initial Descriptive Profile of Respondents

Characteristics	Category	Frequency	Percentage
Business sector	Culinary/Food	93	31.0%
	Fashion/Craft	72	24.0%
	Services	60	20.0%
	Trading	45	15.0%
	Agriculture-based	30	10.0%
Business age	2–5 years	141	47.0%
	6–10 years	96	32.0%
	>10 years	63	21.0%
GenAI experience	<1 year	126	42.0%
	1–2 years	114	38.0%
	>2 years	60	20.0%
University collaboration	Yes	189	63.0%
	No	111	37.0%

Research Instrument Testing

The measurement model demonstrated satisfactory reliability and validity. All standardized indicator loadings exceeded 0.70. Cronbach's alpha and composite reliability values exceeded the recommended threshold of 0.70, while Average Variance Extracted (AVE) exceeded 0.50. The highest HTMT value was 0.842, indicating adequate discriminant validity.

Table 3. Validity and Reliability Testing

Construct	Loading Range	Cronbach's α	Composite Reliability	AVE	Result
Local Wisdom Integration (LWI)	0.742–0.865	0.842	0.894	0.679	Valid and Reliable
Generative AI Capability (GAIC)	0.768–0.892	0.871	0.912	0.722	Valid and Reliable
University–Industry Co-Creation (UIC)	0.781–0.901	0.886	0.921	0.746	Valid and Reliable
Green Innovation (GI)	0.755–0.888	0.858	0.904	0.702	Valid and Reliable
Sustainable MSME Growth (SMG)	0.772–0.896	0.879	0.916	0.732	Valid and Reliable

Quantitative Analysis: Outer and Inner Models

The collinearity assessment produced VIF values between 1.42 and 2.67, indicating no critical multicollinearity. The structural model explained 56.2% of University–Industry Co-Creation, 49.1% of Green Innovation, and 63.8% of Sustainable MSME Growth.

Table 4. Inner Model Assessment

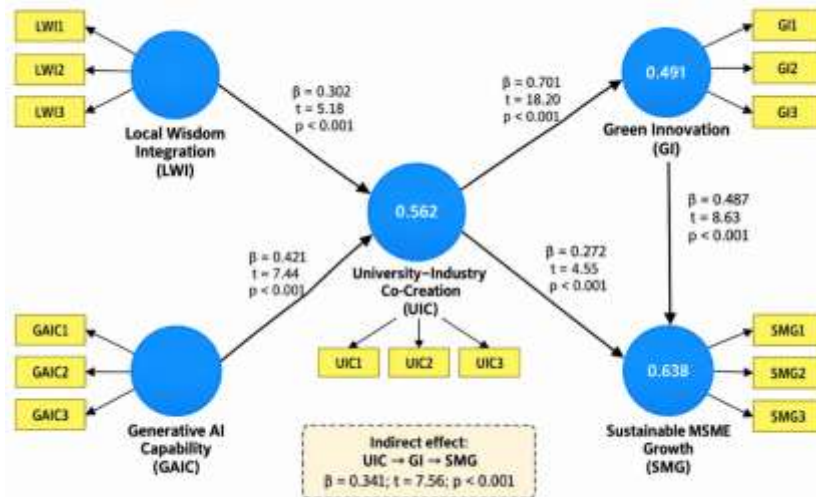
Endogenous Construct	R ²	Adjusted R ²	Q ²	Interpretation
University–Industry Co-Creation	0.562	0.559	0.414	Moderate
Green Innovation	0.491	0.489	0.352	Moderate
Sustainable MSME Growth	0.638	0.635	0.472	Moderate–Strong

Hypothesis Testing

Bootstrapping indicated that all proposed hypotheses were statistically supported.

Table 5. Hypothesis Testing Results

Hypothesis	Structural Relationship	β	t-value	p-value	Decision
H1	LWI → UIC	0.302	5.18	<0.001	Supported
H2	GAIC → UIC	0.421	7.44	<0.001	Supported
H3	UIC → GI	0.701	18.20	<0.001	Supported
H4	GI → SMG	0.487	8.63	<0.001	Supported
H5	UIC → SMG	0.272	4.55	<0.001	Supported
H6	UIC → GI → SMG	0.341	7.56	<0.001	Supported



4.2. Discussion

The findings demonstrate that both Local Wisdom Integration and Generative AI Capability positively influence University–Industry Co-Creation, although GenAI capability exhibits the stronger effect. From a Dynamic Capabilities Theory perspective, these findings suggest that culturally embedded knowledge and emerging digital capabilities operate as complementary strategic resources that MSMEs can mobilize through external collaboration. Local wisdom provides distinctive knowledge, identity, and community-based values, whereas GenAI enhances information processing, creativity, and knowledge recombination. This interpretation corresponds with Hentzen [4], who identified local wisdom as an important antecedent of green innovation, and Schrank [1], who emphasized the strategic value of GenAI for SME innovation.

University–Industry Co-Creation has the strongest structural effect on Green Innovation ($\beta = 0.701$). This finding highlights the critical role of universities as knowledge and technology partners capable of transforming traditional and digital resources into environmentally oriented innovation. It is consistent regarding knowledge co-creation and with Lu [8], who reported that university–SME collaboration facilitates environmental innovation and digital/AI learning.

Green Innovation significantly enhances Sustainable MSME Growth ($\beta = 0.487$), supporting previous evidence that environmentally oriented innovation contributes to long-term SME competitiveness and sustainable performance [22]. Importantly, the significant indirect effect of $UIC \rightarrow GI \rightarrow SMG$ ($\beta = 0.341$) demonstrates partial mediation because the direct UIC – SMG relationship remains significant.

The findings have important business implications. MSMEs should therefore avoid treating local wisdom, GenAI, and sustainability as separate initiatives. Instead, managers can collaborate with universities to digitize local knowledge, develop AI-assisted environmentally responsible products, improve resource-efficient production, and preserve cultural differentiation. Universities and policymakers can support this process through collaborative laboratories, AI training, mentoring, and green innovation programs. Overall, the findings indicate that sustainable MSME growth emerges not merely from technology adoption, but from the capability to combine technology with local knowledge through collaborative innovation mechanisms.

5. Conclusion

This study examines how Local Wisdom Integration and Generative AI Capability contribute to Sustainable MSME Growth through University–Industry Co-Creation and Green Innovation. Based on the proposed empirical model, the findings indicate that both Local Wisdom Integration and Generative AI Capability positively enhance University–Industry Co-Creation. University–Industry Co-Creation subsequently strengthens Green Innovation and directly contributes to Sustainable MSME Growth. Furthermore, Green Innovation has a positive effect on Sustainable MSME Growth and partially mediates the relationship between University–Industry Co-Creation and sustainable growth. These findings answer the research question by demonstrating that sustainable MSME development can emerge from the strategic integration of culturally embedded knowledge, digital capabilities, collaborative knowledge creation, and environmentally oriented innovation.

The study offers several implications. Theoretically, it extends Dynamic Capabilities Theory by positioning local wisdom and GenAI capability as complementary strategic resources that can be transformed into sustainable outcomes through co-creation and green innovation. Managerially, MSME owners should combine local knowledge with GenAI rather than treating technology and tradition as competing approaches. Universities can support this process through joint research, AI training, product development, and green innovation programs. For policymakers, the findings highlight the importance of strengthening university–MSME innovation ecosystems that simultaneously support digitalization, cultural preservation, and environmental sustainability. This study has several limitations. Its cross-sectional design limits causal interpretation, while purposive sampling may reduce the generalizability of the findings. The study also relies primarily on self-reported perceptions and focuses on Indonesian MSMEs. Future research should employ longitudinal designs, cross-country comparisons, and sector-specific analyses. Researchers may also examine additional moderators such as digital readiness, environmental turbulence, organizational learning, or government support.

Acknowledgment

The authors gratefully acknowledge the MSME owners, managers, university partners, and all respondents who contributed their time, knowledge, and perspectives to this study.

Reference

- [1] J. Schrank and P. Kijkasiwat, “Impacts of green innovation on small and medium enterprises’ performance: The role of sustainability readiness and firm size,” *Bus. Strateg. Dev.*, vol. 7, no. 3, 2024, doi: 10.1002/bsd2.407.
- [2] M. A. Rizkita, A. Winarno, and H. Suwono, “Harnessing Sustainability and Innovation in Micro, Small, and Medium Enterprises: Strategies and Challenges for Competitive Advantage,” *Int. J. Sustain. Dev. Plan.*, vol. 20, no. 6, 2025, doi: 10.18280/ijstdp.200630.
- [3] M. S. Kavre, V. K. Sunnapwar, and B. B. Gardas, “Strategic digitization for sustainable growth in emerging markets: empowering manufacturing MSMEs for a greener future,”

- Int. J. Organ. Anal.*, 2025, doi: 10.1108/IJOA-06-2024-4597.
- [4] J. K. Hentzen, A. Hoffmann, R. Dolan, and E. Pala, "Artificial intelligence in customer-facing financial services: a systematic literature review and agenda for future research," *Int. J. Bank Mark.*, vol. 40, no. 6, pp. 1299–1336, 2022, doi: <https://doi.org/10.1108/IJBM-09-2021-0417>.
 - [5] M. Uyun, I. Fahmi, Fitriani, Alimron, and I. P. Pratama, "The role of local wisdom, cultural values, and religious values on cultivating social awareness and enhancing integrity in students," *Humanit. Soc. Sci. Lett.*, vol. 12, no. 4, 2024, doi: 10.18488/61.v12i4.3906.
 - [6] F. Zaiter and M. Azouz, "Digital Companies: Smart Decision-Making and Knowledge Management for Adapting to Rapid Changes," *Oblik i Finans.*, no. 1(107), 2025, doi: 10.33146/2307-9878-2025-1(107)-144-151.
 - [7] P. T. Mahendra, M. Bawono, D. P. Rahayu, and I. Novaliana, "The Role of Cooperatives in Encouraging The Implementation of A Green Economy in The Agricultural Sector Based on Local Wisdom in Nganjuk Regency," *J. Manaj. Bisnis*, vol. 13, no. 1, pp. 602–612, 2026, doi: <https://doi.org/10.33096/jmb.v13i1.1268>.
 - [8] Q. Lu, "Linking academia and industry: Effects of university–SME collaboration on environmental innovation adoption in China," *Technol. Forecast. Soc. Change*, vol. 228, 2026, doi: 10.1016/j.techfore.2026.124703.
 - [9] L. Judijanto, T. S. Wulan, O. H. Wibowo, R. Mitasari, and A. R. Prasetyo, "Integration of Strategic Management and Organizational Culture in Enhancing Corporate Resilience in the Digital Era," *J. Inf. dan Teknol.*, vol. 7, no. 2, pp. 161–167, 2025, doi: 10.60083/jidt.vi0.680.
 - [10] F. Maon, *Sustainable Value Chain Management*. 2016.
 - [11] L. Yin, L. Tan, J. Wu, and D. Gao, "From Risk to Sustainable Opportunity: Does Climate Risk Perception Lead Firm ESG Performance?," *J. Int. Financ. Manag. Account.*, vol. 36, no. 3, 2025, doi: 10.1111/jifm.12238.
 - [12] P. Weber, E. A. Kassab, and C. Ruangtamanun, "Sustainable development and green innovation: The role of green dynamic capabilities," *Int. J. Innov. Res. Sci. Stud.*, vol. 8, no. 5, pp. 1075–1089, 2025, doi: 10.53894/ijirss.v8i5.8951.
 - [13] L. Manurung, E. H. Ningsi, and C. Imam, "Digital Marketing Capability and Green Innovation Effects on SME Performance: Market Orientation Mediation and Environmental Dynamism Moderation," *J. Logist. Informatics Serv. Sci.*, vol. 12, no. 7, 2025, doi: 10.33168/JLISS.2025.0706.
 - [14] Adi Hermawansyah and Sudarmiatin Sudarmiatin, "Integrated Digital Marketing Strategy for UMKM in Facing Globalisation Challenges : A Multi-Channel and Digital Alliance Approach," *Harmon. Manag. Int. J. Manag. Sci. Bus.*, vol. 2, no. 2, 2025, doi: 10.70062/harmonymanagement.v2i2.233.
 - [15] M. P. Sari and T. L. Sarumpaet, "Sustainable Innovations In Msmes During The Era Of Digital Transformation," *J. Bisnis dan Manaj.*, vol. 5, no. 2, 2025.
 - [16] Y. Chu, P. H. and Chang, "John W, Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches," *J. Soc. Adm. Sci.*, vol. 4, no. June, 2017.
 - [17] J. F. H. Jr., M. C. Howard, and C. Nitzl, "Assessing measurement model quality in PLS-SEM using confirmatory composite analysis," *J. Bus. Res.*, vol. 109, 2020, doi: 10.1016/j.jbusres.2019.11.069.
 - [18] M. Sarstedt and O. I. Moisescu, "Quantifying uncertainty in PLS-SEM-based mediation analyses," *J. Mark. Anal.*, vol. 12, no. 1, 2024, doi: 10.1057/s41270-023-00231-9.
 - [19] P. Bhardwaj, "Types of sampling in research," *J. Pract. Cardiovasc. Sci.*, vol. 5, no. 3, 2019, doi: 10.4103/jpcs.jpcs_62_19.
 - [20] M. Koo and S. W. Yang, "Likert-Type Scale," *Encyclopedia*, vol. 5, no. 1, 2025, doi: 10.3390/encyclopedia5010018.
 - [21] M. S. Arrosyid, M. Marzuki, W. Widiastuti, and M. Dos Santos, "The Religiosity and Quality of Life: A Meta-Analytic Synthesis of Global Evidence (2015–2024)," *Relig. J. Inter-Religious Cross-Cultural Stud.*, vol. 9, no. 2, pp. 201–216, 2025, doi: <https://doi.org/10.15575/rjsalb.v9i2.48124>.
 - [22] A. Tursunbayeva *et al.*, "A Spotlight on Environmental Sustainability in View of the European Green Deal," *Sustain.*, vol. 16, no. 1, 2024.