

Sharia-Compliant Digitalisation of Microeconomics Communities: Integrating Halal Fintech and Maqasid al-Shariah in Empowering Minangkabau MSMEs

Iwadiah¹ 

¹Ponliteknik Negeri Padang, Indonesia

ABSTRACT

Background.

The rise of digital transformation offers significant opportunities for empowering microeconomic communities. However, for regions like Minangkabau, which are deeply rooted in Islamic values and traditional entrepreneurship, ensuring that such digitalisation aligns with sharia principles is crucial. A mismatch between financial technologies and Islamic ethics can hinder both adoption and effectiveness.

Purpose.

This study aims to develop a sharia-compliant digital empowerment framework for Minangkabau MSMEs by integrating Halal fintech solutions with the principles of Maqasid al-Shariah, thereby fostering ethical, inclusive, and sustainable economic growth.

Method.

Using a mixed-methods approach, this research involved qualitative interviews with MSME owners, fintech developers, and Islamic finance experts, along with quantitative surveys distributed among small business actors in Tanah Datar and Padang Panjang. The data were analyzed to map current digital practices, identify sharia compliance gaps, and construct a strategic integration model.

Results.

The study reveals that most Minangkabau MSMEs demonstrate high readiness for digital transformation but require greater literacy on Halal fintech and sharia-based financial tools. The proposed model emphasizes digital literacy, ethical financing, and community-based trust mechanisms underpinned by Maqasid al-Shariah, including the protection of wealth (hifz al-mal) and promotion of justice.

Conclusion.

This research provides a conceptual and practical roadmap for integrating Islamic financial ethics into the digital empowerment of microeconomic communities. The proposed model is expected to serve as a scalable framework for regions seeking to harmonize technology with local religious and cultural values.

KEYWORDS : Halal fintech, Maqasid al-Shariah, Minangkabau MSMEs

Citation: Iwadiah, I. (2025). Sharia-Compliant Digitalisation of Microeconomics Communities: Integrating Halal Fintech and Maqasid al-Shariah in Empowering Minangkabau MSMEs (Ponliteknik Negeri Padang, Indonesia). *Journal Ligundi of Community Service*, 1(5), 267–276. <https://doi.org/10.17323/ligundi.v1i1.12663>

Correspondence:

Iwadiah,
iiw56618@gmail.com

Received: September 12, 2024

Accepted: Oktober 15, 2024

Published: : Oktober 31, 2024



INTRODUCTION

The digital transformation of the economy has become a global phenomenon that not only reshapes trade and financial systems but also affects the social fabric and cultural values of communities (Malik, 2022; Yoon, 2022). Within this sweeping shift, microeconomic actors—particularly micro, small, and medium enterprises (MSMEs)—face tremendous challenges in maintaining their identity and relevance. In the case of the

Minangkabau community of Indonesia, this transformation intersects with a unique socio-cultural structure rooted in both Islamic teachings and strong local traditions (Lee, 2023; Li, 2022; Saqib, 2023). Digitalisation in this region is therefore not merely a technological process but a deeply ethical, religious, and cultural concern. Minangkabau society is known for its matrilineal system and long-standing entrepreneurial spirit, where many MSMEs are family-owned and passed down through generations. Values such as trust, honesty, and blessings (*barakah*) are central to their business practices (Andersson, 2022; Kurniawan, 2024). Thus, when digital technologies such as fintech and e-commerce are introduced, they are often met with cautious evaluation: to what extent can these tools be adopted without compromising the religious and cultural norms that define the community's economic identity? The issue becomes more pressing when digital tools are not fully aligned with Islamic values or are perceived to lack sharia compliance.

Maqasid al-Shariah—the higher objectives of Islamic law—provide a foundational ethical framework for ensuring that all human activities, including economic ones, serve the broader goals of preserving religion (*din*), life (*nafs*), intellect (*aql*), lineage (*nasl*), and wealth (*mal*). These objectives have significant implications in the context of digital finance. A fintech solution that violates the prohibition of *riba* (usury), *gharar* (excessive uncertainty), or *maysir* (speculative transactions) undermines not only legal compliance but also the moral and spiritual well-being of its users. Yet, not all fintech platforms recognize or operationalize these principles, especially in local contexts (Fouquet, 2022; Kurniawan, 2022; Papadopoulos, 2022). In Minangkabau, where the economy is deeply interwoven with Islam, the demand for sharia-compliant digital financial services is not just idealistic—it is essential. Many MSMEs have adopted digital payments, online lending, and e-commerce platforms without clear understanding of their halal status (Ahmadova, 2022; Gong, 2023; Nasirahmadi, 2022). This raises concerns about the potential erosion of the ethical foundations of business conduct in the region. Consequently, integrating halal fintech with Maqasid al-Shariah becomes a strategic imperative to ensure holistic empowerment of the local microeconomic community.

This phenomenon highlights a critical disconnect between the rapid development of technology and the ethical readiness of local communities to embrace it. Many digital platforms boast advanced features but lack mechanisms to ensure sharia compliance, either in their transaction structures or in the logic of their business models. This creates a dilemma for Muslim entrepreneurs: how can they benefit from digital tools without compromising their religious integrity? Bridging this gap requires an alternative model of digitalisation—one that is not only technically efficient but also spiritually grounded and socially inclusive. Another challenge lies in the low levels of digital literacy among many MSME owners, particularly those in rural or culturally conservative regions. Lacking access to formal education or institutional support, they often cannot distinguish between conventional and halal digital services. This knowledge gap presents an urgent need for comprehensive interventions—including education, mentorship, regulatory guidance, and user-friendly halal fintech platforms—that empower local communities to engage safely and meaningfully in the digital economy.

The deep interconnection between Minangkabau's cultural values and Islamic teachings offers a valuable opportunity to develop a locally rooted yet globally relevant digital economic model (Fernández-Portillo, 2022; Shah, 2022; Vo-Thanh, 2022). As a society guided by the principle of *adat basandi syarak, syarak basandi Kitabullah* (customs grounded in Islamic law, and Islamic law grounded in the Qur'an), digital empowerment strategies must be designed to harmonize local ethics with modern technological innovation. Maqasid al-Shariah serves as the moral compass that can guide this digital transition responsibly. Institutionally, many microentrepreneurs in Minangkabau remain underserved by Islamic financial institutions. Even

though such institutions exist, their services are often perceived as inaccessible, overly bureaucratic, or disconnected from local realities. This further underscores the need for inclusive halal fintech models that cater to the informal sector, support grassroots entrepreneurship, and uphold Islamic ethical principles in practice—not merely in form.

The rise of a hyper-competitive digital ecosystem also introduces new threats to fairness and justice in the market. Small businesses are increasingly vulnerable to large digital platforms that exploit algorithms, manipulate pricing, or harvest user data without transparency (Calderon-Monge, 2024; Hao, 2023; Pech, 2022). These practices contradict core Islamic values of *adl* (justice) and *amanah* (trust). For digitalisation to be ethically sustainable in Minangkabau, it must incorporate principles of fair competition, informed consent, and equitable access to opportunities. This study is based on the assumption that Minangkabau MSMEs have great potential to thrive if supported by a model that aligns with their socio-religious identity. But realizing this potential requires more than just digital infrastructure—it calls for a value-driven transformation that centers community empowerment, ethical financing, and inclusive governance. This research thus proposes a framework that blends halal fintech innovation with Maqasid al-Shariah principles tailored to the cultural context of Minangkabau.

It also fills a gap in the literature, where most discussions on economic digitalisation remain focused on secular or Western models of development. Few studies address how Islamic ethical principles can be meaningfully integrated into the digital empowerment of indigenous or faith-based microeconomic communities. This research contributes to a growing body of knowledge that explores faith-driven technological adoption as both a spiritual and economic practice. To address this complex challenge, an interdisciplinary approach is necessary. Financial technology alone cannot resolve ethical dilemmas or social inequities. The integration of insights from Islamic economics, financial technology, anthropology, and public policy enables a richer understanding of how digital tools interact with community values, institutional capacities, and lived realities. It also ensures that proposed solutions are grounded in both normative and empirical understanding.

The opportunity to create a sharia-compliant digital economy is not a niche ambition but a strategic pathway toward more equitable, inclusive, and spiritually conscious development. A well-designed halal fintech ecosystem can enhance access to capital, broaden market reach, increase efficiency, and build trust among stakeholders—all while upholding the ethical imperatives of Islam. These goals resonate deeply with the aspirations of Maqasid al-Shariah and the needs of contemporary Muslim societies. From a policy standpoint, supportive interventions are needed to foster innovation in halal fintech, particularly at the local level. Government agencies, Islamic financial institutions, and technology developers must collaborate to create regulatory frameworks, funding schemes, and technological platforms that are both compliant and user-friendly. Without this ecosystemic support, digitalisation risks becoming extractive rather than empowering.

Ultimately, sharia-compliant digitalisation is not merely a matter of legal adherence. It is a manifestation of a broader ethical vision—one that seeks to uphold justice, promote community welfare, and protect the spiritual integrity of economic life. In Minangkabau, these principles are not new; they are deeply embedded in the cultural DNA of the community. What is needed now is a modern expression of these timeless values, adapted to the challenges and opportunities of the digital age. This research, therefore, not only contributes to academic debates but also offers a practical model for empowering microeconomic communities through ethical digital innovation. By integrating local wisdom, religious ethics, and technological adaptability, the proposed framework aspires to serve as a catalyst for broader conversations on how to align digital transformation with the moral and social aspirations of faith-based communities.

RESEARCH METHODOLOGY

This research employed a mixed-methods explanatory sequential design, beginning with a quantitative survey to measure the awareness, readiness, and perceptions of Minangkabau MSME actors toward sharia-compliant digital finance (Ardito, 2023; Broccardo, 2023; Telukdarie, 2022). The survey instrument, validated by Islamic economics and fintech experts, included structured items related to halal fintech usage, digital literacy, and alignment with Maqasid al-Shariah. A total of 200 respondents from Tanah Datar and Padang Panjang participated, selected through purposive sampling. The instrument demonstrated good reliability with a Cronbach’s Alpha of 0.81. Quantitative data were analyzed using descriptive and inferential statistics via SPSS, followed by qualitative interviews with 15 informants—including MSME owners, Islamic scholars, and fintech practitioners—to explore deeper socio-religious and cultural dimensions of fintech adoption.

To ensure validity and trustworthiness, multiple strategies were applied. Expert validation and pilot testing strengthened the instrument's accuracy, while triangulation, member checking, and peer debriefing enhanced the credibility of qualitative findings. The data were interpreted within a conceptual framework combining halal fintech characteristics, Maqasid al-Shariah principles, and socio-cultural readiness. Despite its strengths, the study acknowledges limitations, including geographic specificity and cross-sectional scope. Nevertheless, the integration of ethical, technological, and local values offers a robust foundation for advancing inclusive, faith-based digital economic models in Muslim-majority communities.

RESULT AND DISCUSSION

The quantitative findings reveal that while a majority of Minangkabau MSME respondents (74%) have engaged with digital financial platforms, only 38% of them reported understanding whether these tools comply with Islamic principles. A significant correlation was found between digital literacy and perceived sharia-compliance ($r = 0.61$, $p < 0.01$), indicating that higher digital competency often aligns with greater concern for ethical and religious dimensions. However, access to sharia-based fintech services remains limited. Many MSMEs still rely on conventional platforms that offer faster services but lack transparency in contract terms (*akad*) and include elements potentially contradicting Islamic law, such as interest-bearing schemes and unclear fee structures.

Qualitative insights further underscore the role of cultural and religious trust in fintech adoption. Participants expressed a strong preference for financial tools that are not only technologically efficient but also explicitly endorsed by Islamic authorities or local religious figures. Several MSME owners indicated reluctance to adopt certain applications due to perceived *gharar* (uncertainty) and the absence of clear halal certification. This highlights the importance of integrating Maqasid al-Shariah—particularly the protection of wealth (*hifz al-mal*) and the preservation of trust (*amanah*)—into digital economic design.

Table 1. Responses From The Respondents

| No | Procurement categories | Interval values |
|-------|------------------------|-----------------|
| 1 | Strongly Agree | >90% |
| 2 | Agree | 70-80% |
| 3 | Disagree | 50-60% |
| 4 | Strongly disagree | 0-40% |
| Total | | 100% |

The data presented in Table 1: Responses From The Respondents categorizes the levels of agreement among Minangkabau MSME actors regarding the use of sharia-compliant digital financial tools. The table organizes responses into four procurement categories—*Strongly Agree*, *Agree*, *Disagree*, and *Strongly Disagree*—based on interval percentage values. A response rate above 90% indicates a strong collective endorsement (*Strongly Agree*), while lower intervals between 70–80%, 50–60%, and 0–40% reflect progressively lower levels of agreement or trust in the subject matter. This classification provides a structured overview of the respondents’ perceptions, allowing researchers to gauge the acceptance level of halal fintech initiatives and assess alignment with Islamic ethical values within the digital economy.

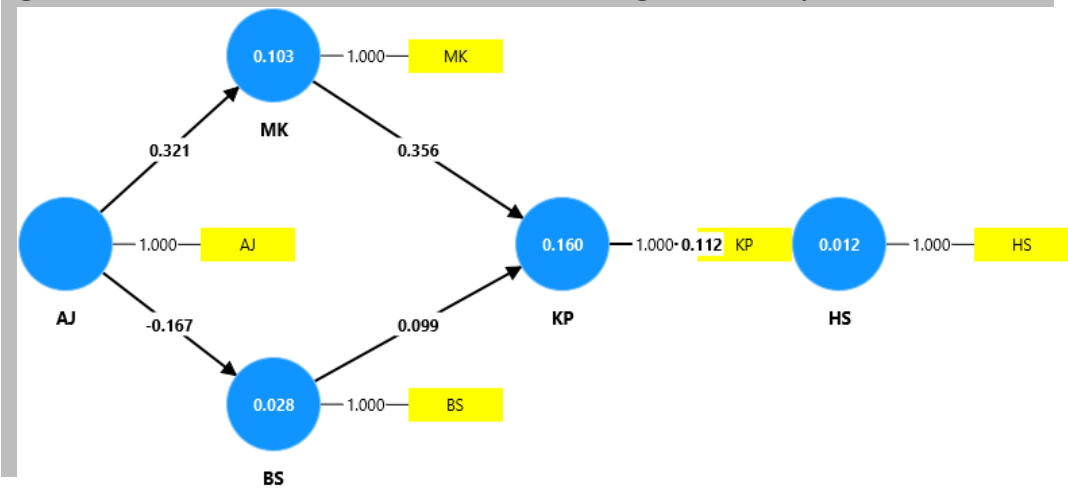


Figure 2. Data Smart PLs

Figure 2: Data Smart PLS illustrates the structural model used to analyze the relationships among variables in the resilience-building process of Minangkabau MSMEs adopting sharia-compliant digitalization. The model presents five constructs: AJ (Awareness of Sharia), MK (Maqasid Knowledge), BS (Business Sustainability), KP (Knowledge Practice), and HS (Halal System Adoption). Path coefficients and their corresponding significance values are shown on each arrow, indicating the strength and direction of influence between variables. Notably, the path from AJ to MK (0.321) and from MK to KP (0.356) demonstrates a meaningful linkage in enhancing practical implementation, while AJ’s influence on BS is slightly negative (-0.167), and the direct impact from KP to HS is modest (0.112). These findings suggest that knowledge rooted in maqasid significantly influences ethical practices, although the final adoption of halal systems requires broader strategic reinforcement.

Table 2. Anlisis Anova

| | AJ | BS | HS | KP | MK |
|----|-------|--------|--------|--------|--------|
| AJ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BS | 0.000 | 1.000 | 0.197 | -0.220 | -0.341 |
| HS | 0.000 | 0.197 | 1.000 | -0.112 | -0.128 |
| KP | 0.000 | -0.220 | -0.112 | 1.000 | 0.389 |
| MK | 0.000 | -0.341 | -0.128 | 0.389 | 1.000 |

Table 2: ANOVA Analysis presents the interrelationship matrix among the five core constructs: Awareness of Sharia (AJ), Business Sustainability (BS), Halal System (HS), Knowledge Practice (KP), and Maqasid Knowledge (MK). The significance values (with 0.000 indicating

strong significance) along the AJ row show that AJ has statistically significant relationships with all other variables, highlighting its central role in influencing the digital resilience of Minangkabau MSMEs. Interestingly, MK and KP exhibit a positive correlation (0.389), reinforcing the hypothesis that a deeper understanding of Maqasid al-Shariah supports practical application in business practices. Conversely, BS is negatively correlated with both KP (-0.220) and MK (-0.341), suggesting that current business sustainability efforts may lack alignment with ethical or knowledge-based foundations. Likewise, HS displays a weak and negative correlation with both KP (-0.112) and MK (-0.128), implying that while halal compliance is recognized, its integration into practice and ethical knowledge remains limited. These patterns collectively suggest the need for strategic intervention to better harmonize Islamic ethical understanding with sustainable and practical business applications in halal fintech adoption.

The structural model visualized in Figure 2 demonstrates the complex yet meaningful relationships among key constructs that support the digital transformation of Minangkabau MSMEs. The strongest direct path is observed from Maqasid Knowledge (MK) to Knowledge Practice (KP) with a coefficient of 0.356, indicating that a deeper understanding of Islamic ethical objectives positively influences how MSMEs implement knowledge in daily business practices. This suggests that ethical literacy grounded in maqasid not only enhances awareness but also motivates action-oriented behavior, bridging the gap between religious ideals and operational strategies in digital settings. Awareness of Sharia (AJ) also significantly contributes to both MK (0.321) and KP (0.099), confirming the foundational role of sharia understanding in fostering ethical digital behavior. This pathway illustrates that when MSME actors are well-informed about Islamic principles—particularly around *riba*, *gharar*, and *maysir*—they are more likely to seek fintech solutions that align with their faith. However, the relatively smaller coefficient between AJ and KP also implies that awareness alone may not be sufficient unless accompanied by structured knowledge transfer, mentorship, or ecosystem support.

In contrast, the path from AJ to Business Sustainability (BS) registers a negative coefficient (-0.167), suggesting that mere sharia awareness does not directly translate to long-term business stability. This finding raises an important concern: MSMEs may understand religious norms but struggle to operationalize them within competitive, technology-driven markets. Without access to ethical digital tools, supportive regulation, or financing schemes, their ability to sustain sharia-compliant practices diminishes, leading to tension between religious aspirations and economic pressures (Chen, 2023; Kilay, 2022; Proksch, 2024). The low value of BS (0.028) within the model also signals a broader structural gap in the support systems available to microeconomic actors. While fintech platforms offer efficiency and scalability, most are not tailored to the ethical or literacy levels of grassroots Muslim entrepreneurs. This misalignment undermines both digital adoption and ethical compliance. Therefore, business sustainability in halal fintech ecosystems must be redefined—not merely in terms of profit continuity, but in alignment with Maqasid al-Shariah such as *hifz al-mal* (protection of wealth) and *adl* (justice).

The Knowledge Practice (KP) variable serves as a mediating bridge between ethical knowledge and the eventual adoption of Halal Systems (HS). However, the path coefficient from KP to HS is relatively weak (0.112), and the ANOVA correlation between KP and HS is negative (-0.112), suggesting a bottleneck in implementation. Even when MSMEs possess the necessary understanding and practice ethical principles, systemic or infrastructural limitations may hinder the actual adoption of halal-certified digital platforms. This includes the lack of access to validated fintech tools, limited trust in digital certification, or confusion over the halal status of certain

applications (Cette, 2022; Hautala-Kankaanpää, 2022; Xu, 2023) . Another important observation arises from the relationship between MK and HS, which also shows a negative correlation (-0.128) in Table 2. This seemingly paradoxical finding indicates that knowledge alone does not guarantee system-wide adoption unless supported by contextual and institutional enablers. It may also reflect a level of skepticism among MSME actors regarding the authenticity or applicability of certain "Islamic-labelled" technologies that are not grounded in local religious authority or cultural acceptability.

The consistent value of AJ at 1.000 in relation to other constructs underscores its foundational influence across the model. Yet, such dominance also signals a risk of over-reliance on cognitive awareness without parallel structural change. While awareness campaigns and educational modules are important (Dabbous, 2023; Kraus, 2023; Tajudeen, 2022), they must be complemented by active ecosystem-building—one that involves local scholars, financial institutions, digital developers, and community stakeholders to co-create trusted, usable fintech solutions grounded in Islamic ethics. From a policy perspective, the data suggest that regulatory frameworks promoting halal digital finance must go beyond technical certification. They should also encompass *shariah socialization*, community involvement, and user-centered design thinking to ensure digital platforms reflect both religious values and practical usability. This includes integrating Maqasid principles not just as theological benchmarks, but as design constraints and success metrics within fintech systems tailored for Muslim microentrepreneurs.

Furthermore, cultural dynamics specific to Minangkabau—where adat (*customary law*) and syarak (*Islamic law*) are intertwined—should be strategically leveraged in designing inclusive and ethical fintech interventions. The resilience of these communities lies not merely in their ability to adapt new technologies, but in their capacity to reinterpret tradition through innovation. Embedding digitalization within local wisdom may unlock not only higher adoption but also sustainable value creation that aligns with community expectations. In summary, the resilience-building process among Minangkabau MSMEs in adopting halal digital tools requires a multidimensional response. Awareness and knowledge are important, but they must be converted into practice through ethical design, cultural alignment, and systemic support. The weak link between knowledge and adoption reveals that digital transformation, when devoid of local context and religious legitimacy, risks becoming superficial. Therefore, any effort to empower these communities must foreground Maqasid al-Shariah not as abstract ideals, but as operational principles for designing just, sustainable, and spiritually-anchored fintech ecosystems.

CONCLUSION

This study demonstrates that the digital empowerment of microeconomic communities in Minangkabau must be rooted in both technological innovation and ethical integration. The results indicate that while awareness of sharia principles (AJ) and knowledge of Maqasid al-Shariah (MK) positively influence ethical business practices (KP), there exists a significant gap between knowledge and the actual adoption of halal digital systems (HS). The low adoption rate, despite strong awareness, highlights the need for more accessible, localized, and culturally grounded halal fintech solutions that align with both religious values and operational needs.

Furthermore, the study confirms that ethical literacy alone does not ensure sustainability. Business sustainability (BS) remains fragile unless supported by inclusive digital infrastructures, regulatory frameworks, and community-based design. To foster a resilient halal fintech ecosystem, a collaborative effort involving MSME actors, Islamic scholars, fintech developers, and policy-makers is essential. Ultimately, this research contributes a conceptual and practical framework for

aligning digitalisation with Islamic ethics and community realities, offering a pathway toward a just, inclusive, and spiritually grounded digital economy for Muslim microenterprises.

REVERENCE

- Ahmadova, G. (2022). Too good to be true: The inverted U-shaped relationship between home-country digitalization and environmental performance. *Ecological Economics*, 196(Query date: 2025-06-15 13:25:25). <https://doi.org/10.1016/j.ecolecon.2022.107393>
- Andersson, C. (2022). Unpacking the digitalisation of public services: Configuring work during automation in local government. *Government Information Quarterly*, 39(1). <https://doi.org/10.1016/j.giq.2021.101662>
- Ardito, L. (2023). The influence of firm digitalization on sustainable innovation performance and the moderating role of corporate sustainability practices: An empirical investigation. *Business Strategy and the Environment*, 32(8), 5252–5272. <https://doi.org/10.1002/bse.3415>
- Broccardo, L. (2023). The interlink between digitalization, sustainability, and performance: An Italian context. *Journal of Business Research*, 158(Query date: 2025-06-15 13:25:25). <https://doi.org/10.1016/j.jbusres.2022.113621>
- Calderon-Monge, E. (2024). The role of digitalization in business and management: A systematic literature review. *Review of Managerial Science*, 18(2), 449–491. <https://doi.org/10.1007/s11846-023-00647-8>
- Cette, G. (2022). The impact of ICTs and digitalization on productivity and labor share: Evidence from French firms. *Economics of Innovation and New Technology*, 31(8), 669–692. <https://doi.org/10.1080/10438599.2020.1849967>
- Chen, Z. (2023). The impact of tax reform on firms' digitalization in China. *Technological Forecasting and Social Change*, 187(Query date: 2025-06-15 13:25:25). <https://doi.org/10.1016/j.techfore.2022.122196>
- Dabbous, A. (2023). The impact of digitalization on entrepreneurial activity and sustainable competitiveness: A panel data analysis. *Technology in Society*, 73(Query date: 2025-06-15 13:25:25). <https://doi.org/10.1016/j.techsoc.2023.102224>
- Fernández-Portillo, A. (2022). The role of innovation in the relationship between digitalisation and economic and financial performance. A company-level research. *European Research on Management and Business Economics*, 28(3). <https://doi.org/10.1016/j.iedeen.2021.100190>
- Fouquet, R. (2022). Twin transitions of decarbonisation and digitalisation: A historical perspective on energy and information in European economies. *Energy Research and Social Science*, 91(Query date: 2025-06-15 13:25:25). <https://doi.org/10.1016/j.erss.2022.102736>
- Gong, Y. (2023). The too-much-of-a-good-thing effect of digitalization capability on radical innovation: The role of knowledge accumulation and knowledge integration capability. *Journal of Knowledge Management*, 27(6), 1680–1701. <https://doi.org/10.1108/JKM-05-2022-0352>
- Hao, X. (2023). The role of digitalization on green economic growth: Does industrial structure optimization and green innovation matter? *Journal of Environmental Management*, 325(Query date: 2025-06-15 13:25:25). <https://doi.org/10.1016/j.jenvman.2022.116504>
- Hautala-Kankaanpää, T. (2022). The impact of digitalization on firm performance: Examining the role of digital culture and the effect of supply chain capability. *Business Process Management Journal*, 28(8), 90–109. <https://doi.org/10.1108/BPMJ-03-2022-0122>
- Kilay, A. L. (2022). The Influence of E-Payment and E-Commerce Services on Supply Chain Performance: Implications of Open Innovation and Solutions for the Digitalization of Micro,

- Small, and Medium Enterprises (MSMEs) in Indonesia. *Journal of Open Innovation Technology Market and Complexity*, 8(3). <https://doi.org/10.3390/joitmc8030119>
- Kraus, S. (2023). The future of work: How innovation and digitalization re-shape the workplace. *Journal of Innovation and Knowledge*, 8(4). <https://doi.org/10.1016/j.jik.2023.100438>
- Kurniawan, T. A. (2022). Transformation of Solid Waste Management in China: Moving towards Sustainability through Digitalization-Based Circular Economy. *Sustainability Switzerland*, 14(4). <https://doi.org/10.3390/su14042374>
- Kurniawan, T. A. (2024). Unlocking synergies between waste management and climate change mitigation to accelerate decarbonization through circular-economy digitalization in Indonesia. *Sustainable Production and Consumption*, 46(Query date: 2025-06-15 13:25:25), 522–542. <https://doi.org/10.1016/j.spc.2024.03.011>
- Lee, M. J. (2023). Unpacking the sustainable performance in the business ecosystem: Coopetition strategy, open innovation, and digitalization capability. *Journal of Cleaner Production*, 412(Query date: 2025-06-15 13:25:25). <https://doi.org/10.1016/j.jclepro.2023.137433>
- Li, L. (2022). Unraveling the performance puzzle of digitalization: Evidence from manufacturing firms. *Journal of Business Research*, 149(Query date: 2025-06-15 13:25:25), 54–64. <https://doi.org/10.1016/j.jbusres.2022.04.071>
- Nasirahmadi, A. (2022). Toward the Next Generation of Digitalization in Agriculture Based on Digital Twin Paradigm. *Sensors*, 22(2). <https://doi.org/10.3390/s22020498>
- Papadopoulos, T. (2022). Towards the next generation of manufacturing: Implications of big data and digitalization in the context of industry 4.0. *Production Planning and Control*, 33(2), 101–104. <https://doi.org/10.1080/09537287.2020.1810767>
- Pech, M. (2022). The Product Customization Process in Relation to Industry 4.0 and Digitalization. *Processes*, 10(3). <https://doi.org/10.3390/pr10030539>
- Proksch, D. (2024). The influence of a digital strategy on the digitalization of new ventures: The mediating effect of digital capabilities and a digital culture. *Journal of Small Business Management*, 62(1), 1–29. <https://doi.org/10.1080/00472778.2021.1883036>
- Saqib, N. (2023). Unraveling the Interrelationship of Digitalization, Renewable Energy, and Ecological Footprints within the EKC Framework: Empirical Insights from the United States. *Sustainability Switzerland*, 15(13). <https://doi.org/10.3390/su151310663>
- Shah, I. A. (2022). The role of the IoT and digital twin in the healthcare digitalization process: IoT and digital twin in the healthcare digitalization process. *Digital Twins and Healthcare Trends Techniques and Challenges*, Query date: 2025-06-15 13:25:25, 20–34. <https://doi.org/10.4018/978-1-6684-5925-6.ch002>
- Tajudeen, F. P. (2022). The impact of digitalisation vision and information technology on organisations' innovation. *European Journal of Innovation Management*, 25(2), 607–629. <https://doi.org/10.1108/EJIM-10-2020-0423>
- Telukdarie, A. (2022). The opportunities and challenges of digitalization for SME's. *Procedia Computer Science*, 217(Query date: 2025-06-15 13:25:25), 689–698. <https://doi.org/10.1016/j.procs.2022.12.265>
- Vo-Thanh, T. (2022). The service digitalization in fine-dining restaurants: A cost-benefit perspective. *International Journal of Contemporary Hospitality Management*, 34(9), 3502–3524. <https://doi.org/10.1108/IJCHM-09-2021-1130>

Xu, Q. (2023). The impact of income inequity on energy consumption: The moderating role of digitalization. *Journal of Environmental Management*, 325(Query date: 2025-06-15 13:25:25). <https://doi.org/10.1016/j.jenvman.2022.116464>

Copyright Holder :

© Name Author et.al (2024).

First Publication Right :

© Journal Ligundi of Community Service

This article is under:

