

## The Influence of Digital Transformation Based on Religious Ethics on MSME Performance in the Industry 4.0 Era

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### Abstract

*The rapid advancement of Industry 4.0 necessitates that Micro, Small, and Medium Enterprises (MSMEs) adopt digital transformation to enhance competitiveness and long-term sustainability. However, in regions where religious values significantly shape business practices, digital transformation must align with ethical considerations. This study examines the impact of digital transformation, moderated by religious ethics, on MSME performance in Pekalongan City, Central Java, Indonesia. Employing a quantitative approach with a census method, the research surveyed 180 MSMEs that have integrated digital technologies while adhering to religious ethical principles. Data analysis was conducted using Structural Equation Modeling - Partial Least Squares (SEM-PLS) with WarpPLS 8.0 software. The findings indicate that digital transformation significantly enhances MSME performance, with religious ethics playing a crucial role in reinforcing ethical decision-making and ensuring business sustainability. Additionally, religious ethics moderate the relationship between digital transformation and business performance, fostering trust, accountability, and social responsibility. This study underscores the need for policy interventions, improved digital literacy, and enhanced infrastructure to facilitate MSME digitalization. By bridging the gap between digital transformation and ethical business practices, the research contributes to the discourse on sustainable MSME development within Islamic economic frameworks.*

### Keywords:

Digital Transformation,  
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## 1. Introduction

The rapid evolution of Industry 4.0 has transformed business operations globally, compelling enterprises—including Micro, Small, and Medium Enterprises (MSMEs)—to adopt digital transformation to enhance efficiency and competitiveness. Emerging technologies such as the Internet of Things (IoT), big data analytics, cloud computing, and artificial intelligence have revolutionized business models, enabling firms to respond swiftly to market demands, optimize resource allocation, and expand into global markets (Schwab, 2017). Digital transformation is thus essential for ensuring MSMEs' long-term sustainability in an increasingly dynamic economic landscape (Ng & Kee, 2021). However, despite the urgency of digital adoption, many MSMEs in Indonesia face significant barriers in embracing this transformation. According to the Ministry of Cooperatives and SMEs (Kemenkop, 2023), only 30% of MSMEs have integrated digitalization into their operational frameworks, highlighting a substantial gap between digital transformation imperatives and MSMEs' readiness to adapt to evolving business conditions.

Pekalongan, a city in Central Java, Indonesia, renowned for its batik industry and local handicrafts, provides a compelling case study of MSME digital transformation. Although market competition and consumer preferences increasingly favor digital platforms, many MSMEs in Pekalongan continue to operate through traditional business models. Global trade dynamics have intensified the pressure on these enterprises to adopt digital technologies for efficiency and market expansion (Setyawan et al., 2022). However, structural and cultural challenges—including limited digital literacy, financial constraints, and entrenched conventional business practices—impede MSMEs from fully leveraging digital transformation. Data from the Cooperative and MSME Office of Pekalongan City (2022) indicates that 70% of MSMEs in the region operate conventionally, with minimal integration of digital tools. This further emphasizes the digital divide among these enterprises (Yadav, 2020).

Religious values and ethical considerations strongly influence business decisions among Pekalongan's MSMEs, beyond technological challenges. As a city with a predominantly Muslim population, religious ethics shape business operations, fostering consumer trust, corporate social responsibility, and market legitimacy. Sunaryo (2023) highlights that religious ethics promote fairness, accountability, and integrity in economic transactions, reinforcing ethical business conduct. However, existing studies have yet to comprehensively examine the intersection of digital transformation and religious ethics. While technological adoption is typically discussed in economic and operational terms, the ethical dimensions of digitalization—particularly in Muslim-majority business communities—remain underexplored (Ali & Alharbi, 2022).

Current literature on digital transformation predominantly focuses on its technical and economic advantages, often neglecting the sociocultural and ethical dimensions that influence its adoption. For instance, Ng & Kee (2021) emphasize technological integration strategies such as big data implementation and cloud-based business solutions, without considering the mediating role of ethical values in digital adoption. This oversight represents a significant research gap, especially in contexts where religious principles strongly inform business norms and decision-making processes (Ali & Alharbi, 2022). Furthermore, Setyawan et al. (2022) notes that digitalization is frequently perceived as disrupting traditional ethical business interactions, diminishing personal engagement, and altering trust-based commercial relationships. Therefore, it is imperative to explore how digital transformation can align with religious ethical frameworks to ensure sustainable business practices in Muslim-majority MSME sectors.

To address these gaps, this study investigates the influence of digital transformation, moderated by religious ethics, on MSME performance in Pekalongan City within the Industry 4.0 era. Specifically, the research aims to (1) analyze the impact of digital transformation on MSME performance, (2) examine the moderating role of religious ethics in shaping this relationship, and (3) identify the challenges MSMEs face in adopting digital transformation while maintaining adherence to religious ethical principles. By achieving these objectives, the study seeks to provide a nuanced understanding of the interplay between technological advancement and ethical business considerations.

This research contributes to the broader discourse on digital transformation and ethical business practices, particularly within Islamic economic frameworks. The findings offer empirical insights into how MSMEs can strategically integrate digital transformation while upholding religious ethical values, presenting practical implications for policymakers, business practitioners, and scholars in Islamic business studies. Additionally, the study bridges the gap between digitalization strategies and ethical economic frameworks, proposing a model for MSMEs in Pekalongan—and similar regions—to navigate technological transitions without compromising core ethical values (Rahayu & Day, 2017). Ultimately, this research aspires to guide policymakers in formulating inclusive and ethically grounded digital transformation policies that support MSME growth while preserving the integrity of Islamic business ethics.

## **2. Method**

This study examines the impact of digital transformation, moderated by religious ethics, on the performance of MSMEs in Pekalongan City during the Industry 4.0 era. This study analyzes MSME owners/managers who have both integrated digital technology into their operations and adhere to religious ethical principles. This selection is based on the growing necessity for MSMEs to adapt to digital transformation while maintaining ethical business practices, particularly in religiously conservative regions such as Pekalongan. The study contributes to the broader discourse on sustainable digital business transformation and ethical entrepreneurship by addressing a critical gap in the literature regarding the intersection of digitalization and religious ethics in business contexts.

A quantitative research design employing a survey method is used to systematically investigate the relationships between digital transformation, religious ethics, and MSME performance. The choice of a quantitative approach is justified by its capacity to provide empirical measurement and statistical analysis, thereby enhancing the objectivity and reliability of findings (Hair et al., 2019). The survey method facilitates the collection of standardized data from a broad population, making it well-suited for hypothesis testing and generalizing results within the MSME sector (Creswell & Creswell, 2018). To analyze complex relationships between multiple dependent, independent, and moderating variables, this study applies Structural Equation Modeling (SEM) using Partial Least Squares (PLS), an advanced statistical technique (Hair et al., 2019).

Both primary and secondary data sources are utilized to ensure a comprehensive understanding of the research topic. Primary data were collected through structured surveys distributed to 180 MSMEs in Pekalongan City, all of which were identified as businesses implementing digital transformation initiatives while maintaining a strong religious ethical orientation (Dinkop and UMKM Pekalongan, 2022). A census sampling approach was employed, including all MSMEs meeting the criteria to ensure maximum representativeness. Secondary data were obtained from government reports, academic literature, and industry-specific publications on digital transformation and business ethics

in MSMEs, thereby reinforcing the validity and contextual relevance of the study's findings.

The survey questionnaire was developed using validated scales from prior research in the domains of digital transformation, religious business ethics, and MSME performance. It was structured into multiple sections covering demographic information, digital adoption practices, ethical considerations in business decision-making, and performance indicators. A five-point Likert scale (1–5) was used to assess respondents' perceptions of various aspects of digital transformation and religious ethics. Data collection was conducted over three months to ensure adequate response rates and mitigate potential biases. The survey was administered through both face-to-face interviews and an online platform, ensuring accessibility for MSME owners with varying levels of digital engagement.

To analyze the collected data, this study employs Structural Equation Modeling – Partial Least Squares (SEM-PLS) using WarpPLS 8.0 software. This method was chosen for its ability to handle small-to-medium sample sizes, accommodate complex models, and examine both direct and moderating effects (Hair et al., 2019). The analytical process involves three main stages. First, validity and reliability testing are conducted to ensure that the measurement constructs are robust and meet internal consistency criteria. Second, the structural model is evaluated by testing the hypothesized relationships between variables using path coefficients and significance levels. Finally, a moderation analysis is performed to determine how religious ethics influence the relationship between digital transformation and MSME performance. By adopting this rigorous methodological approach, the study ensures reliability, replicability, and practical applicability, offering valuable insights into the role of ethical considerations in digital business transformation.

### 3. Results and Discussion

This study examines the impact of digital transformation and religious ethics on MSME performance in Pekanbaru City using the SEM-PLS approach (WarpPLS 8.0). The following section presents the comprehensive results and discussion. Data were collected through a questionnaire utilizing a five-point Likert scale (1–5), measuring three primary variables: digital transformation, which assesses the extent of digital technology integration in business operations, marketing, and data management; religious ethics, which evaluates ethical business practices based on religious principles; and MSME performance, which is gauged through indicators such as sales growth, operational efficiency, and customer satisfaction. The analysis focuses on determining the influence of digital transformation and religious ethics on MSME performance.

#### Measurement Model (Outer Model)

The measurement model was evaluated to assess the validity and reliability of the research instruments. The results of convergent validity, discriminant validity, and reliability tests are summarized as follows:

Table 1. Data Validity Testing

Construct	AVE	Composite Reliability	Cronbach's Alpha
Digital Transformation	0.65	0.91	0.88
Religious Ethics	0.68	0.92	0.89
MSME Performance	0.61	0.89	0.84

Source: Processed Data

All constructs demonstrated acceptable convergent validity, with Average Variance Extracted (AVE) values exceeding the 0.5 threshold. The discriminant validity test confirms that the correlation between constructs is lower than the square root of each construct's AVE, ensuring the constructs' distinctiveness. Additionally, the reliability test results, with Composite Reliability and Cronbach's Alpha values exceeding 0.7 for all variables, affirm the internal consistency and reliability of the research instrument (Hair et al., 2019).

### Structural Model Evaluation (Inner Model)

The structural model evaluation was conducted to test the relationships among the study variables. The path coefficients and significance values obtained from the SEM-PLS analysis are presented in Table 2.

Table 2. Path Coefficient Results

Relationship Between Variables	Path Coefficient	t-statistic	p-value	Significance
Digital Transformation → MSME Performance	0.50	7.325	0.000	Significant
Religious Ethics → MSME Performance	0.40	6.250	0.000	Significant
Digital Transformation, Religious Ethics → MSME Performance	0.32	5.180	0.000	Significant

Source: Processed Data

### Digital Transformation has a positive and significant effect on MSME Performance

The results indicate that digital transformation has a positive and significant effect on MSME performance, with a path coefficient of 0.50 and a t-statistic of 7.325 ( $p < 0.05$ ). This finding suggests that the greater the degree of digital transformation implementation, the higher the MSME performance. Digital transformation enhances market reach, operational efficiency, and cost-effectiveness, leading to improved sales growth and customer satisfaction. This aligns with Hair et al. (2019), who assert that digital transformation fosters innovation in business processes, enabling firms to generate greater value through the adoption of digital technologies.

Furthermore, these findings are consistent with Bustamante-Mora et al. (2024), who highlight that digital transformation—encompassing information systems, cloud computing, and artificial intelligence—plays a crucial role in strengthening MSME performance in developing economies. Their study also underscores the significance of a supportive entrepreneurial ecosystem and external social influences in facilitating digital adoption. Sepúlveda-Cuevas, et al. (2024) reinforce this perspective, noting that the success of digital transformation in SMEs is contingent upon factors such as technological infrastructure and human resource constraints. They advocate for enhancing technological capacity and providing digital training to SME workers to ensure the effective implementation of digital transformation.

Additionally, Albayay et al. (2024) emphasize the impact of social norms and cultural values on the acceptance of technological innovation among SMEs in culturally diverse regions, highlighting the necessity of a contextual and community-based approach to ensure the sustainability of digital transformation initiatives. Similarly, research by Arango-López et al. (2024) identifies limited digital infrastructure, inadequate policy support, and cultural barriers as key obstacles to technology adoption in MSMEs. Their findings

underscore the crucial role of government and educational institutions in facilitating digital transformation and enhancing MSME performance, particularly in the agribusiness sector (Arango-López et al., 2024).

### **Religious Ethics has a positive and significant effect on MSME Performance**

The results indicate that religious ethics have a positive and significant effect on MSME performance, with a path coefficient of 0.40 and a t-statistic of 6.250 ( $p < 0.05$ ). This finding suggests that the strong implementation of religious ethics in MSMEs—encompassing principles such as honesty, fairness, and social responsibility—positively influences business performance. This impact arises from the trust and favorable reputation that consumers attribute to MSMEs adhering to robust ethical principles. These results align with the study by Von Berlepsch et al. (2022), which highlights the role of reputation and moral responsibility in fostering sustainable competitive advantages through the integration of strong business ethics.

Furthermore, these findings are consistent with research by Arli et al. (2017), which demonstrates that consumer trust in ethically operated MSMEs not only enhances business performance but also fosters higher repurchase intentions and positive customer recommendations. This underscores that embedding religious ethics within business practices offers strategic added value, particularly for MSMEs that depend on direct consumer interactions. Additionally, Tlais (2021) argues that companies that integrate religious ethics into their core organizational values tend to have more engaged and motivated employees. Ethical principles such as honesty, fairness, and social responsibility contribute not only to external credibility but also to an improved internal work environment, ultimately enhancing employee performance and overall business success.

Similarly, Bustamante-Mora et al. (2024) observes that religious ethics-based approaches are often more effective than formal policy interventions in establishing long-term trust and cooperation between business owners and local communities. This finding highlights that the integration of ethical values into business strategies influences not only financial performance but also social relationships that support long-term business sustainability. Thus, the implementation of religious ethics in MSMEs is not merely a tool for moral compliance but also serves as a strategic advantage. Religious ethics provide a foundation for building sustainable trust among businesses and stakeholders, enhancing customer satisfaction, and ultimately improving MSME performance (Muller et al., 2022).

### **Religious Ethics moderate the relationship between Digital Transformation and MSME Performance**

The results further demonstrate that Religious Ethics significantly moderate the relationship between Digital Transformation and MSME Performance, with a path coefficient of 0.32 and a t-statistic of 5.180 ( $p < 0.05$ ). This indicates that MSMEs that integrate religious values such as honesty, responsibility, and fairness into their digital transformation efforts tend to achieve superior business performance. These findings are aligned with Contingency Theory, which posits that the effectiveness of business strategies depends on the alignment between internal and external factors (Fiedler, 1964). In this context, religious ethics function as a moderating factor that enhances the efficacy of digital transformation in improving MSME performance.

These findings are also supported by research from Martín-Rojas et al. (2022), which suggests that adopting digital technology without considering ethical dimensions may pose

challenges to long-term trust and sustainability. The effective application of technology requires an ethical foundation to balance efficiency with consumer trust. This research confirms that businesses prioritizing ethics within their digital strategies tend to develop stronger reputations, leading to improved overall performance. Furthermore, recent studies by Galati et al. (2023) indicate that ethical considerations in digital business environments facilitate greater consumer acceptance of new technologies, thereby contributing to enhanced business performance. As a result, religious ethics not only act as a moderator strengthening the impact of digital transformation on MSME performance but also function as a key factor in securing a sustainable competitive advantage.

Likewise, Karabag & Berggren (2022) argue that in ethics-driven business contexts, digital technology can be leveraged to reinforce transparency and fairness, thereby bolstering public trust. These findings affirm that religious ethics serve not only as a moral guide but also play a critical role in moderating the influence of digital transformation on business performance. Consequently, the integration of technology with ethical values emerges as a fundamental strategy for MSMEs seeking to navigate the dynamic changes in the business landscape successfully.

#### **Factors supporting and hindering digital transformation in MSMEs**

The digital transformation of MSMEs is shaped by various factors that either facilitate or hinder its progress. Sharma and Mishra (2022) highlight several aspects that influence this transformation. Government support plays a crucial role in accelerating digital adoption among MSMEs. Programs focused on digital literacy, financial aid, and infrastructure development enable businesses to integrate digital solutions more effectively. Additionally, greater access to affordable digital tools, such as e-commerce platforms and business management software, enhances the ability of MSMEs to undergo digital transformation (Kinderman et al., 2021). Collaboration with technology providers further strengthens this process by granting businesses access to essential digital resources that support their development.

Despite these advantages, MSMEs face several challenges in adopting digital technology. A major barrier is low digital literacy, as many MSME owners and employees lack the necessary skills to implement and maximize digital tools in their operations (Klein & Todisco, 2021). Financial constraints also pose significant difficulties, as the costs associated with digital technology investments can be burdensome for businesses with limited capital (Ojha et al., 2023). Moreover, inadequate digital infrastructure, particularly in rural areas, restricts the adoption of digital solutions due to poor internet connectivity and a lack of technological support (Khurana et al., 2022; World Bank, 2022).

The results of the Goodness of Fit (GoF) test indicate that the model effectively explains variations in MSME performance, with an R-Square value of 0.71 and a Q-Square Predictive Relevance value of 0.59. An R-Square value of 0.71 suggests that 71% of the variability in MSME performance is influenced by Digital Transformation and Religious Ethics, highlighting their critical role in improving business outcomes. Meanwhile, the Q-Square value of 0.59 demonstrates the model's strong explanatory power and predictive accuracy, affirming its reliability in forecasting future MSME performance.

#### **4. Conclusion**

This study has demonstrated that digital transformation and religious ethics significantly enhance MSME performance in Pekalongan City. Digital transformation fosters efficiency, market expansion, and business sustainability, while religious ethics moderate this

relationship by reinforcing ethical business practices. The integration of religious ethical values into digital transformation creates a synergistic effect, ensuring that MSMEs prioritize not only profit maximization but also business integrity, social responsibility, and customer trust. The findings indicate that MSME owners or managers who successfully balance technological adaptation with ethical business conduct tend to achieve greater resilience and long-term growth. These results suggest that fostering digital transformation in MSMEs should extend beyond technical considerations to incorporate ethical and cultural dimensions, particularly in regions where religious values play a central role.

From an academic perspective, this study contributes to the broader discourse on Islamic business ethics and digital entrepreneurship. Specifically, it highlights the moderating role of religious ethics in business digitalization. This study bridges a significant research gap by integrating ethical and religious dimensions into digital transformation discourse, which has previously focused primarily on technical and economic aspects. By demonstrating that religious ethics support sustainable and responsible digital business practices, this study extends theoretical frameworks on ethical entrepreneurship and provides new insights into how values-based business models enhance MSME resilience in the industry 4.0 era. These findings also have practical implications for policymakers, emphasizing the need for initiatives that promote ethical digitalization in MSMEs through financial incentives, regulatory frameworks, and capacity-building programs.

While this research offers valuable insights into ethically-grounded digital transformation, several limitations should be acknowledged. The research sample was restricted to MSMEs in Pekalongan City, which may limit the generalizability of findings to other regions with different cultural and economic dynamics. Future research should expand the geographical scope to assess whether the observed relationships hold across diverse sociocultural and economic settings. Additionally, this study did not account for the role of government policies and human resource capabilities in shaping digital transformation outcomes, both of which are critical to MSME development. Future studies should explore the interaction between digital transformation, religious ethics, and contextual factors such as government support, market competition, and organizational culture. Conducting a longitudinal study would also offer deeper insights into the long-term impact of ethical digitalization on MSME performance, providing a more comprehensive understanding of how businesses evolve in response to technological and ethical imperatives.

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