Global Review of Islamic Economics and Business, Vol. 14, No. 1 (2026) 43-59
Published by Faculty of Islamic Economics and Business, State Islamic University Sunan Kalijaga Yogyakarta
e-ISSN: 2338-7920, p-ISSN: 2338-2619

Leveraging Digitalization, Innovation and Absorptive Capacity for Entrepreneurial Performance: Evidence from Halal MSMEs in Indonesia

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Keywords:
Digital Technology, Absorptive Capacity, Innovation Capability, Entrepreneurial Performance, Halal MSMEs.

JEL Classification: *D83; L26; O31; Z12*

Article History:
Received: 1 January 2026
Revised: 07 May 2026
Accepted: 08 May 2026
Published: 25 June 2026

Citation:
Yusfiarto et al. (2026). Leveraging Digitalization, Innovation and Absorptive Capacity for Entrepreneurial Performance: Evidence from Halal MSMEs in Indonesia. Global Review of Islamic Economics and Business, 14(1), 20-42.
https://doi.org/10.14421/grieb.2026.141-03

Abstract: This study aims to analyze the effects of Digital Technology and Absorptive Capacity on Product Innovation Capability and their impact on Entrepreneurial Performance among Halal Micro, Small, and Medium Enterprises (MSMEs). The study adopts a quantitative approach using a survey method of Halal MSME owners and managers. Data were analyzed using Partial Least Squares Structural Equation Modeling. The results show that Absorptive Capacity has a positive and significant effect on both Innovation Capability and Entrepreneurial Performance. In addition, Digital Technology also has a positive and significant effect on Innovation Capability as well as MSMEs Entrepreneurial Performance. However, the findings indicate that Product Innovation Capability does not have a significant direct effect on Entrepreneurial Performance. This suggests that improvements in MSME entrepreneurial performance are driven more by firms' ability to absorb knowledge and leverage digital technologies than by product innovation alone. This study implies that Halal MSMEs need to strengthen their learning and knowledge management capabilities and optimize the use of digital technologies in order to enhance competitiveness and entrepreneurial performance. Future research is encouraged to further examine the mediating role of Product Innovation Capability or to incorporate other relevant variables.

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https://doi.org/10.14421/grieb.2026.141-03

Introduction

Halal MSMEs (Micro, Small, and Medium Enterprises) refer to productive business entities that operate in accordance with Islamic principles and halal standards in their production, processing, marketing, and distribution activities (Afdawaiza, Yusfiarto, et al., 2025). These enterprises are typically owned by individuals or small business entities and operate on a small to medium scale with limited capital, assets, and turnover (Tambunan, 2011). Despite these limitations, Halal MSMEs play a crucial role in national economic development by creating employment opportunities, supporting inclusive growth, and strengthening the halal value chain (Afdawaiza, Supriani, et al., 2025; Mohd Yunus et al., 2025). Moreover, Halal MSMEs are widely recognized for their entrepreneurial creativity, innovation, and responsiveness to changing consumer preferences, particularly in the rapidly growing halal market (Afandi et al., 2025; Asiyah et al., 2023; Harsanto et al., 2024).

The rapid advancement of digital technology has significantly transformed business activities within the halal MSME sector (Asiyah et al., 2023; Mohd Yunus et al., 2025). Digital technologies not only support operational efficiency but also serve as strategic enablers for enhancing competitiveness and market access (Harsanto et al., 2024). Through digital platforms, halal MSMEs can reach Muslim and non-Muslim consumers beyond local markets, ensure greater transparency in halal compliance, and improve communication with suppliers, certification bodies, and customers (Giyanti et al., 2021; Sharabati et al., 2024; Yusfiarto & Pambekti, 2019). Digital tools also facilitate data-driven decision making, allowing halal MSMEs to better understand consumer behavior, demand patterns, and emerging trends in the halal industry (Asiyah et al., 2023; Faiz et al., 2024; Giordino et al., 2025; Mohd Yunus et al., 2025; Sharabati et al., 2024; Ta & Lin, 2023).

However, the mere adoption of digital technology does not automatically lead to superior product innovation in halal MSMEs. Firms must also possess strong absorptive capacity, defined as the ability to acquire, assimilate, transform, and exploit external knowledge (Avalos-Quispe & Hernández-Simón, 2019; Jeong et al., 2019). In the halal context, this includes the capability to understand new halal standards, certification requirements, consumer expectations, and technological developments (Aboelmaged & Hashem, 2019; Afandi et al., 2025; Kamal & Flanagan, 2014). Absorptive capacity enables halal MSMEs to translate digital information and technological inputs into innovative halal products that meet both market demand and Shariah compliance. Consequently, stronger product innovation capability is expected to enhance entrepreneurial performance in terms of sales growth, profitability, and business sustainability within the competitive halal market (Khan et al., 2021; Mamun et al., 2017; Yusfiarto et al., 2022).

This study offers several important contributions to the existing literature. First, it extends the halal entrepreneurship and innovation literature by integrating Digital Technology and Absorptive Capacity within a unified framework to explain Product Innovation Capability and Entrepreneurial Performance. While previous studies have often examined these constructs in isolation, this research provides a more comprehensive understanding of how knowledge-based capabilities and digital resources interact to drive innovation and performance in halal MSMEs. Second, by focusing specifically on halal-oriented enterprises, this study addresses a significant gap in the literature, as most innovation and digitalization studies have been conducted in conventional MSME contexts, thereby overlooking the unique regulatory, ethical, and market dynamics of the halal industry.

The remainder of this manuscript is structured as follows. The next section reviews the relevant literature and develops the theoretical framework and research hypotheses. This is followed by a description of the research methodology, including data collection, measurement, and analytical procedures. The subsequent section presents and discusses the

empirical results. Finally, the last section concludes the paper by outlining the key findings, theoretical and practical implications, limitations, and directions for future research.

Literature Review and Hypothesis Development

Islamic Entrepreneurship and Halal MSMEs

Islamic entrepreneurship refers to entrepreneurial activities that are guided by Islamic values and principles, including honesty (*sidq*), trustworthiness (*amanah*), fairness (*'adl*), social responsibility, and compliance with Shariah (Afandi et al., 2025; Kayed & Hassan, 2010; Purwidianti et al., 2023; Rehan et al., 2019). Unlike conventional entrepreneurship, which primarily emphasizes profit maximization, Islamic entrepreneurship integrates economic objectives with ethical and spiritual goals, aiming to achieve falah (success in this world and the hereafter) (Afdawaiza, Yusfiarto, et al., 2025; Nur Azizah et al., 2023). Entrepreneurs are expected not only to create value and generate income, but also to ensure that their business activities promote social welfare, avoid harmful practices such as *riba*, *gharar*, and *maysir*, and contribute to justice and sustainability (Gümüsay, 2015; Khoirunnisa et al., 2023; Ratten et al., 2017; Smith et al., 2023). In this sense, Islamic entrepreneurship encourages innovation, risk-taking, and value creation within a framework of moral accountability and social responsibility, making it particularly relevant in Muslim-majority contexts and the rapidly expanding halal economy (Afandi et al., 2025).

Within this framework, halal SMEs represent a practical manifestation of Islamic entrepreneurship in contemporary markets. Halal SMEs operate in accordance with Shariah principles by ensuring that their products, processes, and business practices comply with halal standards, including sourcing, production, certification, and distribution (Afandi et al., 2025; Afdawaiza, Yusfiarto, et al., 2025; Giyanti et al., 2021). These enterprises play a critical role in the development of the halal industry, which encompasses not only food and beverages but also cosmetics, pharmaceuticals, fashion, tourism, and digital services (Nur Azizah et al., 2025). Beyond religious compliance, halal SMEs are increasingly recognized as competitive business entities that respond to rising global demand for halal, ethical, and quality-assured products (Nur Azizah et al., 2025). By combining Islamic values with entrepreneurial orientation, halal SMEs contribute to inclusive economic growth, job creation, and sustainable development while simultaneously meeting the expectations of increasingly conscious consumers in both Muslim and non-Muslim markets.

Absorptive Capacity

Zahra & George (2002) conceptualize absorptive capacity as a broad organizational capability that encompasses a firm's overall ability to learn, apply new knowledge, disseminate it internally, and create new resources, including new technologies. More specifically, absorptive capacity is commonly defined as a set of organizational routines and processes through which firms acquire, assimilate, transform, and exploit knowledge in order to build dynamic organizational capabilities (Versiani et al., 2021). This concept has continued to evolve and is now widely recognized as a critical dynamic resource that plays a crucial role in enhancing firm competitiveness, including in the context of MSMEs (Afandi et al., 2025; Ávila, 2022; Mata et al., 2024). A higher level of absorptive capacity enables MSMEs to better adapt to changes in the external environment, identify alternative solutions, and generate meaningful innovations that improve organizational performance. MSMEs with strong absorptive capacity are more responsive to market and technological changes, adapt more quickly, and exhibit greater creativity in addressing business challenges (Afandi et al., 2025; Elidjen et al., 2025; Hurtado-Palomino et al., 2022; Mamun et al., 2017).

Innovation Capability

According to Pickernell et al. (2009) innovation refers to the introduction of new ideas, processes, products, or services that are implemented to improve organizational performance and meet changing market needs. Organizations that consistently engage in innovation are considered innovative, as they continuously seek new ways to create value and respond to environmental changes (Hermawati, 2020). Innovation can take both tangible and intangible forms, including new technologies, business models, services, operational processes, and organizational practices (Andriansyah et al., 2024). Therefore, innovation is not limited to the creation of new offerings but also involves the development of new ways of doing business that generate superior value for customers and stakeholders (Yusfiarto et al., 2022). Furthermore, (Saunila, 2020) emphasize that a high level of innovation capability is reflected in three key organizational activities: the ability to identify emerging market opportunities, the development of capabilities to respond effectively to those opportunities, and the organizational capacity to rapidly capture and exploit them. These capabilities enable firms to transform knowledge and market insights into innovative solutions that strengthen competitiveness and support long-term business performance (Purwati et al., 2021).

Digital Technology Capability

Digital technology refers to technologies whose operations rely primarily on automated systems and computer-based processes rather than extensive human intervention (Faiz et al., 2024). These technologies are based on binary digits (bits) that are designed to store, process, and transmit information through digital systems that operate using two discrete states or values. In the business context, digital technology enables firms to connect with customers more easily and efficiently through platforms such as websites, social media, and digital applications (Cen & Lin, 2025; Faiz et al., 2024; Ibrahim & Aduah, 2025). These platforms facilitate interaction with customers, the collection of feedback, and the development of long-term relationships. The adoption of digital technology also contributes to improved operational efficiency by streamlining business processes, reducing transaction costs, and enhancing coordination across organizational functions (Giordino et al., 2025; Harsanto et al., 2024). In the rapidly evolving digital business environment, awareness and appropriate digital literacy among business actors are essential to ensure that technology is utilized effectively and responsibly. Moreover, firms are required to continuously adapt to technological developments and leverage digital tools to enhance business quality, expand market reach, and strengthen competitiveness (Al-Mutawa & Saeed Al Mubarak, 2024; Sharabati et al., 2024; Yusfiarto & Pambekti, 2019).

Hypothesis Development

Digital Technology and Innovation Capability

Digital technology is a strategic resource that enhances firms' ability to generate, process, and utilize information, thereby strengthening their innovation capability. From the perspectives Dynamic Capabilities, digital technologies such as digital platforms, data analytics, and online communication tools enable firms to sense market changes, seize emerging opportunities, and reconfigure internal processes to support continuous innovation (Jiao et al., 2025; Liu et al., 2025). For MSMEs, particularly in the halal sector, digital technology facilitates access to customer insights, market trends, and external knowledge, which can be transformed into new ideas, improved processes, and innovative solutions. By enabling faster experimentation, knowledge sharing, and collaboration with external stakeholders, digital technology accelerates innovation cycles and improves firms' capacity to respond creatively to dynamic

market demands (Cen & Lin, 2025; Faiz et al., 2024; Giordino et al., 2025; Radicic & Petković, 2023). Thus, it is hypothesized that:
H1: Digital Technology has a positive and significant effect on Innovation Capability.

Absorptive Capacity and Innovation Capability
Absorptive capacity represents a firm's ability to acquire, assimilate, transform, and exploit external knowledge, which is essential for developing strong innovation capability (Zahra & George, 2002). From the perspective of Dynamic Capabilities Theory, absorptive capacity enables firms to sense valuable knowledge from the external environment, integrate it with existing internal knowledge, and reconfigure organizational resources to generate new ideas, processes, and solutions (Elidjen et al., 2025; Murovec & Prodan, 2009). For MSMEs, particularly in the halal sector, absorptive capacity is critical for understanding evolving halal standards, certification requirements, consumer preferences, and technological developments (Bedoya-Villa et al., 2023; Carrasco-Carvajal et al., 2023; Nuryakin & Qamari, 2026). By effectively absorbing and utilizing such knowledge, halal MSMEs can transform information into innovative practices, improved offerings, and more adaptive business models. Firms with higher absorptive capacity are therefore more capable of learning from their environment and translating that learning into sustained innovation. Accordingly, the following hypothesis is proposed:
H2: Absorptive Capacity has a positive and significant effect on Innovation Capability.

Digital Technology and Entrepreneurial Performance
Digital technology enables firms to improve operational efficiency, enhance market reach, and strengthen customer engagement, all of which are critical for achieving superior entrepreneurial performance (Faiz et al., 2024). From the perspective of Capabilities, digital tools allow firms to sense changes in customer preferences, seize emerging market opportunities, and reconfigure business processes to respond quickly and effectively (Giordino et al., 2025). For MSMEs, particularly in the halal sector, digital platforms facilitate access to wider markets, improve transparency in halal compliance, and support faster and more informed decision making. Moreover, digital technologies reduce transaction costs, enable better coordination with suppliers and customers, and support data-driven strategies that enhance competitiveness (Azizah et al., 2024; Faiz et al., 2024; Yusfiarto et al., 2025; Yusfiarto & Pambekti, 2019). These advantages contribute to higher sales growth, improved profitability, and greater business sustainability. Therefore, it is hypothesized that:
H3: Digital technology has a positive and significant effect on Entrepreneurial Performance

Absorptive Capacity and Entrepreneurial Performance
From the perspective of Dynamic Capabilities Theory, firms that are better able to acquire, integrate, and utilize external knowledge are more capable of sensing market changes, identifying entrepreneurial opportunities, and reconfiguring their resources to respond effectively to competitive pressures (Elidjen et al., 2025; Kim et al., 2025; Zahra & George, 2002). For MSMEs, particularly in the halal sector, this capability enables firms to understand evolving consumer preferences, regulatory requirements, technological developments, and competitive dynamics. By transforming external knowledge into strategic actions, MSMEs can improve decision making, enhance operational efficiency, and develop more adaptive and competitive business strategies (Afandi et al., 2025). These advantages allow firms to achieve higher sales growth, profitability, and long-term sustainability. Accordingly, it is hypothesized that:
H4: Absorptive Capacity has a positive and significant effect on Entrepreneurial Performance

Innovation Capability and Entrepreneurial Performance

Innovation capability reflects a firm's ability to continuously generate, implement, and commercialize new ideas, processes, and solutions that create value for customers and the organization (Faiz et al., 2024; Paovangsa et al., 2025). From the perspectives of the Dynamic Capabilities Theory, innovation capability enables firms to respond proactively to market changes, differentiate themselves from competitors, and sustain competitive advantage (Saunila, 2016; Saunila & Ukko, 2014). For MSMEs, particularly in the halal sector, strong innovation capability allows firms to develop products, services, and business models that better meet evolving consumer preferences, comply with halal standards, and capture emerging market opportunities (Yusfiarto et al., 2022; Yusfiarto & Pambekti, 2019). By introducing new offerings, improving operational processes, and enhancing customer value, innovative firms are more likely to achieve higher sales growth, profitability, and long-term sustainability (Afandi et al., 2025). Therefore, firms with stronger innovation capability are expected to exhibit superior entrepreneurial performance. Accordingly, the following hypothesis is proposed:

H5: Innovation Capability has a positive and significant effect on Entrepreneurial Performance

Research Framework

This conceptual framework illustrates that Digital Technology and Absorptive Capacity are two key capabilities that influence Entrepreneurial Performance of MSMEs both directly and indirectly through Innovation Capability as a central mechanism. Digital technology serves as a strategic resource that enables MSMEs to access market information, improve efficiency, and accelerate decision making, while absorptive capacity determines the ability of firms to acquire, process, and utilize external knowledge effectively. Both factors not only foster the development of innovation capability defined as the ability to generate and implement new ideas, processes, and solutions but also exert a direct impact on entrepreneurial performance. Innovation capability is positioned as a critical pathway that links technology- and knowledge-based resources to business outcomes (see figure 1).

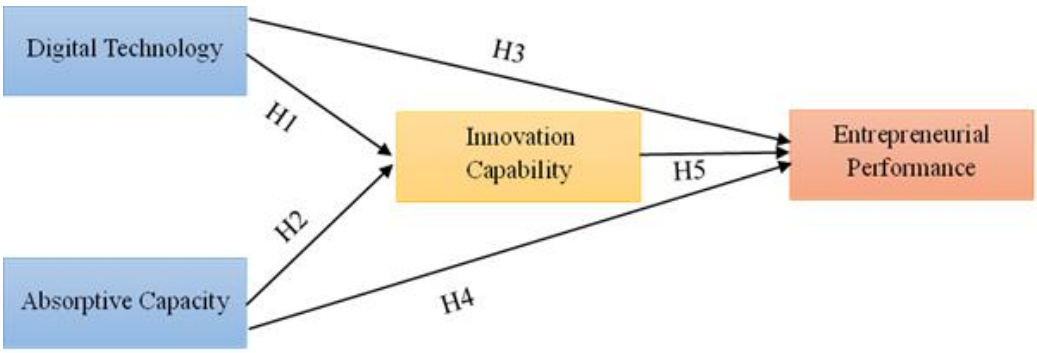

Figure 1. Research Framework

Method

Participant and Procedure

This study adopts a survey design using self-administered questionnaires. Data were collected through both offline (face-to-face) and online modes. To minimize the potential for social desirability bias, all respondents were assured of the anonymity and confidentiality of their responses. Such an approach is widely recognized as an effective strategy for reducing socially desirable responding, particularly in studies involving religious or faith-related issues (Krumpal, 2013). The sampling technique employed was purposive sampling, with criteria established in line with the study's objectives (Andrade, 2021), namely: (1) MSME owners,

(2) Muslim individuals, (3) producers or sellers of halal products, and (4) users of digital technology in their business activities. Respondents who did not meet these criteria were excluded from the final analysis.

Measures of Study

All constructs in this study were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The measurement items were adapted from previously validated instruments and adjusted to fit the context of MSME entrepreneurial performance. Absorptive Capacity was measured using five items adapted from Elidjen et al. (2025), such as "*We have the capability to identify relevant sources of knowledge.*" Digital Technology was assessed using five items adapted from Giordino et al. (2025), for example, "*Our firm develops digital products or services and related activities.*" Innovation Capability was measured using seven items adapted from Afandi et al. (2025), including "*Our firm continuously develops programs to reduce production costs*." Finally, Entrepreneurial Performance was measured using five items adapted from Yusfiarto et al. (2025), such as "*Our firm's sales revenue is growing rapidly*." In total, the study obtained 273 valid responses. Demographically, most MSMEs were located in the Special Region of Yogyakarta, Indonesia, and in terms of business scale, the majority were micro and small enterprises.

Data Analysis Approach

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). This technique has been widely applied in Islamic entrepreneurship research and has demonstrated strong empirical validity (Khoirunnisa et al., 2023; Pambekti et al., 2022). The choice of PLS-SEM was driven by the complexity of the proposed model and the study's objective to predict key outcomes and identify their principal antecedents (Hair et al., 2021). Such complexity is reflected in the inclusion of both direct and indirect (mediated) relationships. Accordingly, PLS-SEM is well aligned with the research objectives and model structure. All model estimation and interpretation procedures followed the guidelines outlined by Hair et al. (2019). To ensure that the sample size was statistically adequate, this study applied the inverse square root method, which indicated a minimum required sample size of 155 (Hair et al., 2021). Therefore, the final sample of 273 respondents exceeded this threshold, thereby enhancing the robustness and reliability of the empirical analysis.

Analysis and Discussion

Measurement Model

The measurement model was evaluated by assessing convergent validity, reliability, and discriminant validity. Convergent validity was examined using indicator loadings and the Average Variance Extracted (AVE). All constructs achieved AVE values above the recommended threshold of 0.50, ranging from 0.617 to 0.768 (see Table 1-2), indicating that each construct explains more than half of the variance of its indicators. In addition, all indicator loadings exceeded the minimum acceptable value of 0.70, confirming adequate convergent validity (see figure 1). Construct reliability was assessed using Cronbach's alpha (α), composite reliability based on rho_a, and composite reliability based on rho_c. As reported in Table 2, Cronbach's alpha values ranged from 0.869 to 0.924, while composite reliability (rho_a) ranged from 0.872 to 0.924 and rho_c ranged from 0.906 to 0.943. All these values exceeded the recommended threshold of 0.70, demonstrating strong internal consistency and reliability across all constructs.

Table 1. Constructs Correlation Result

Constructs	Absorptive Capacity	Digital Capability	Entrepreneurial Performance	Innovation Capability
Absorptive Capacity	1.000	0.469	0.512	0.711
Digital Capability	0.469	1.000	0.440	0.511
Entrepreneurial Performance	0.512	0.440	1.000	0.529
Innovation Capability	0.711	0.511	0.529	1.000

Table 2. Reliability and Validity Test Result

Constructs	a	CR (rho_a)	CR (rho_c)	AVE
Absorptive Capacity	0.869	0.872	0.906	0.658
Digital Capability	0.924	0.924	0.943	0.768
Entrepreneurial Performance	0.871	0.874	0.907	0.661
Innovation Capability	0.895	0.900	0.918	0.617

Moreover, the correlation matrix shows that all constructs are positively and moderately related, indicating meaningful associations without multicollinearity concerns. Absorptive Capacity is moderately correlated with Digital Capability (r = 0.469) and Entrepreneurial Performance (r = 0.512), and more strongly related to Innovation Capability (r = 0.711). This suggests that firms with higher absorptive capacity tend to be more innovative and better at using digital technologies. Digital Capability is moderately associated with both Entrepreneurial Performance (r = 0.440) and Innovation Capability (r = 0.51). Entrepreneurial Performance also shows a moderate positive correlation with Innovation Capability (r = 0.529), indicating that more innovative firms tend to achieve better performance. Overall, the magnitude of the correlations remains below the critical threshold of 0.90, indicating that the constructs are empirically distinct in the structural model estimation (Hair et al., 2010).

Finally, the discriminant validity was evaluated using both the Fornell–Larcker criterion and the Heterotrait–Monotrait ratio (HTMT). Based on the Fornell–Larcker criterion, the square root of AVE for each construct was greater than its correlations with other constructs, indicating that each construct is empirically distinct. Furthermore, as shown in Table 3, all HTMT values were below the conservative threshold of 0.85, ranging from 0.482 to 0.807, which further confirms the presence of adequate discriminant validity. Overall, the results indicate that the measurement model demonstrates satisfactory levels of validity and reliability, thereby supporting the robustness of the constructs used in this study. Table 3 provides details on discriminant validity.

Table 3. Discriminant Validity Test Result

Constructs	Absorptive Capacity	Digital Capability	Entrepreneurial Performance	Innovation Capability
Absorptive Capacity	**0.811**	0.524	0.577	0.807
Digital Capability	0.469	**0.877**	0.482	0.559
Entrepreneurial Performance	0.512	0.440	**0.813**	0.586
Innovation Capability	0.711	0.511	0.529	**0.786**

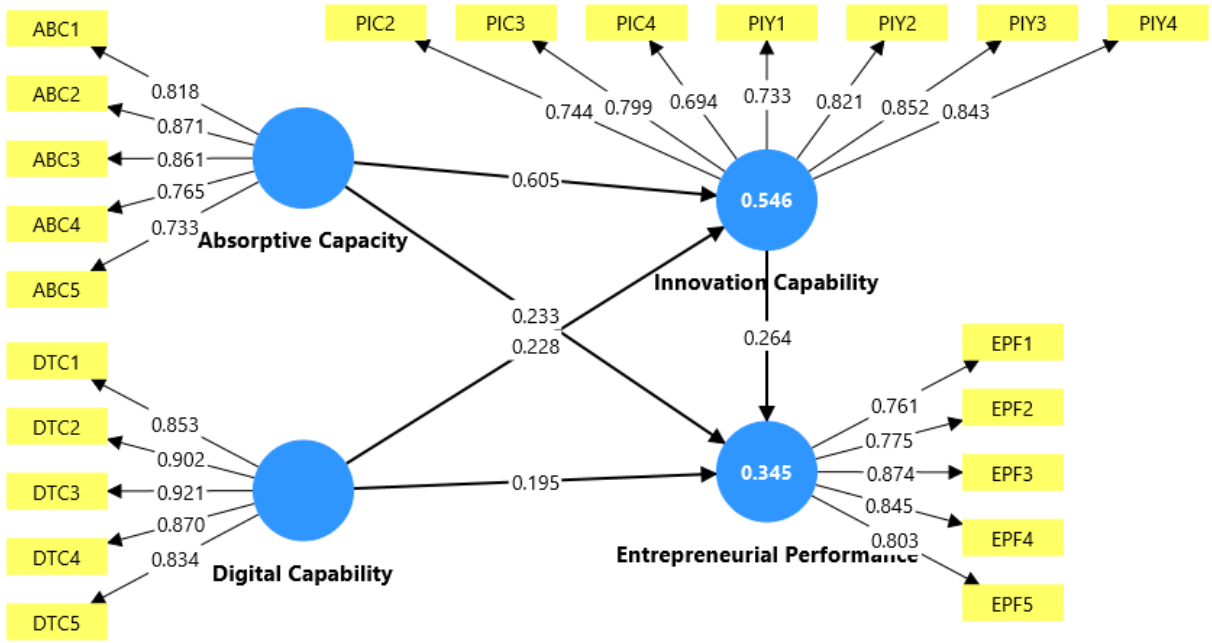

Figure 2. PLS Algorithm Analysis

Structural Model

The structural model was evaluated by examining the coefficient of determination (R^2), predictive relevance (Q^2_predict), and out-of-sample prediction accuracy using RMSE and MAE. As reported in Table X, Entrepreneurial Performance achieved an R^2 value of 0.345 (adjusted R^2 = 0.337), indicating that the model explains 34.5% of the variance in entrepreneurial performance, which represents a moderate level of explanatory power. Meanwhile, Innovation Capability recorded a higher R^2 of 0.546 (adjusted R^2 = 0.543), suggesting that more than half of the variance in innovation capability is explained by its antecedent constructs, reflecting strong explanatory power. The model's predictive relevance was assessed using Q^2_predict. Both endogenous constructs produced Q^2 values well above zero (0.293 for Entrepreneurial Performance and 0.534 for Innovation Capability), confirming that the model exhibits substantial predictive relevance (see Table 4).

Table 4. Structural Model Analysis

Constructs	R^2	R^2 adjusted	Q^2predict	RMSE	MAE
Entrepreneurial Performance	0.345	0.337	0.293	0.853	0.658
Innovation Capability	0.546	0.543	0.534	0.691	0.515

To assess the overall model fit, this study first examined the Standardized Root Mean Square Residual (SRMR). The SRMR value of 0.063 is below the recommended threshold of 0.08, indicating a good fit between the empirical data and the proposed model (Hair et al., 2019). The predictive performance of the model was further evaluated using PLS-Predict by comparing the prediction errors of the PLS-SEM model with those of a linear model (LM) benchmark (Shmueli et al., 2019). As shown in Table 5, most indicators of Innovation Capability and Entrepreneurial Performance exhibit lower or comparable RMSE and MAE values under PLS-SEM relative to the linear model. Overall, these results suggest that the PLS-SEM model demonstrates strong out-of-sample predictive power, as it consistently outperforms or matches the benchmark linear model across indicators. This provides further

evidence that the proposed model is not only explanatory but also has substantial predictive capability.

Table 5. PLS-Predict Analysis

Contructs	PLS-SEM RMSE	PLS-SEM MAE	LM RMSE	LM MAE
Innovation Capability 1	0.763	0.556	0.775	0.551
Innovation Capability 2	0.816	0.620	0.851	0.640
Innovation Capability 3	0.888	0.732	0.910	0.739
Innovation Capability 4	0.882	0.691	0.899	0.697
Innovation Capability 5	0.756	0.543	0.782	0.565
Innovation Capability 6	0.716	0.549	0.731	0.558
Innovation Capability 7	0.767	0.570	0.795	0.597
Entrepreneurial Performance 1	0.807	0.587	0.827	0.601
Entrepreneurial Performance 2	0.784	0.606	0.797	0.616
Entrepreneurial Performance 3	0.772	0.573	0.784	0.595
Entrepreneurial Performance 4	0.857	0.637	0.862	0.659
Entrepreneurial Performance 5	0.837	0.646	0.853	0.668

Hypothesis Analysis

The hypothesis testing was conducted using a bootstrapping procedure with 5,000 resamples to assess the significance and stability of the path coefficients. As reported in Table X, all hypothesized relationships are statistically significant and supported. Absorptive Capacity has a positive and significant effect on Entrepreneurial Performance ($\beta = 0.233$, $t = 2.912$, $p = 0.004$), indicating that firms with stronger knowledge absorption capabilities tend to achieve higher performance. Moreover, Absorptive Capacity exerts a strong and highly significant influence on Innovation Capability ($\beta = 0.605$, $t = 12.364$, $p < 0.001$), confirming its central role in fostering innovation. Digital Capability also shows a positive and significant impact on both Entrepreneurial Performance ($\beta = 0.195$, $t = 3.603$, $p < 0.001$) and Innovation Capability ($\beta = 0.228$, $t = 4.327$, $p < 0.001$). This suggests that the effective use of digital technologies directly improves firm performance and enhances firms' ability to innovate. Finally, Innovation Capability has a positive and significant effect on Entrepreneurial Performance ($\beta = 0.264$, $t = 3.068$, $p = 0.002$), indicating that innovation plays a critical mediating role in translating absorptive and digital capabilities into superior entrepreneurial outcomes. Overall, these results provide strong empirical support for all proposed hypotheses and confirm the robustness of the structural relationships in the model (see Table 6 and Figure 3).

Table 6. Hypothesis Test

Constructs	β	Mean	t-values	p-values
Absorptive Capacity -> Entrepreneurial Performance	0.233	0.235	2.912	0.004
Absorptive Capacity -> Innovation Capability	0.605	0.607	12.364	0.000
Digital Capability -> Entrepreneurial Performance	0.195	0.197	3.603	0.000
Digital Capability -> Innovation Capability	0.228	0.226	4.327	0.000
Innovation Capability -> Entrepreneurial Performance	0.264	0.263	3.068	0.002

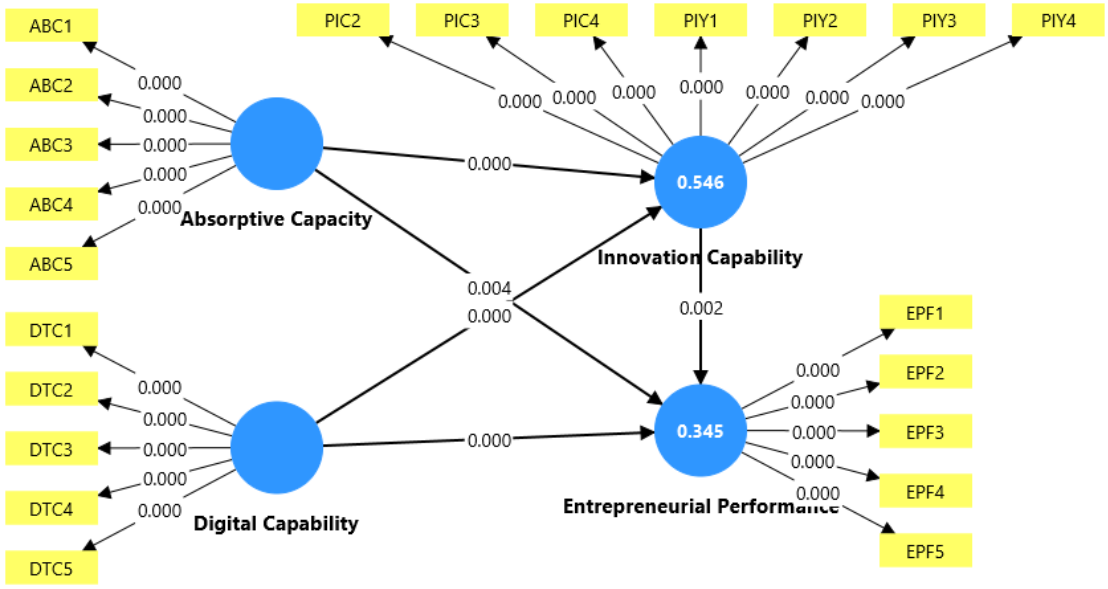

Figure 3. Bootstrapping Analysis Outcome

Robustness Check

To assess the robustness of the estimated relationships and to address potential endogeneity and nonlinearity concerns, this study conducted Gaussian copula tests and quadratic effect analyses. The Gaussian copula test was employed to examine whether the structural relationships are biased by endogeneity. As reported in Table 7, none of the Gaussian copula terms are statistically significant at the 5% level. In addition, all bias-corrected confidence intervals (BCCI) include zero, indicating that endogeneity does not pose a serious threat to the validity of the estimated path coefficients. Furthermore, quadratic effect tests were conducted to examine potential nonlinear relationships among the constructs. As shown in Table 8, none of the quadratic terms are statistically significant, and all confidence intervals include zero. This indicates that the relationships between absorptive capacity, digital capability, innovation capability, and entrepreneurial performance are adequately captured by a linear specification. Overall, the results of both robustness tests confirm that the findings of this study are stable and credibility of the structural model estimates.

Table 7. Gaussian Copula Test

Gaussian Copula	β	t-values	p-values	BCCI 97%
GC (Absorptive Capacity -> Entrepreneurial Performance)	-0.214	1.793	0.073	[-0.467; 0.004]
GC (Absorptive Capacity -> Innovation Capability)	0.134	1.493	0.135	[-0.044; 0.315]
GC (Digital Capability -> Entrepreneurial Performance)	-0.039	0.270	0.787	[-0.356; 0.226]
GC (Digital Capability -> Innovation Capability)	0.035	0.317	0.751	[-0.176; 0.264]
GC (Innovation Capability -> Entrepreneurial Performance)	0.350	1.848	0.065	[-0.015; 0.729]

Table 8. Quadratic Effect Test

Quadratic Effect	β	t-values	p-values	BCCI 95%
QE (Absorptive Capacity) -> Entrepreneurial Performance	-0.064	1.202	0.229	[-0.188; 0.020]
QE (Absorptive Capacity) -> Innovation Capability	0.036	1.012	0.312	[-0.037; 0.103]
QE (Digital Capability) -> Entrepreneurial Performance	0.068	1.603	0.109	[-0.026; 0.144]
QE (Digital Capability) -> Innovation Capability	0.010	0.246	0.805	[-0.074; 0.088]
QE (Innovation Capability) -> Entrepreneurial Performance	0.047	0.883	0.377	[-0.051; 0.148]

Conclusion

This study examined how digital technology and absorptive capacity influence innovation capability and entrepreneurial performance among Halal MSMEs in Indonesia. Absorptive capacity emerged as the strongest driver of innovation capability and also exerted a direct positive effect on entrepreneurial performance, confirming that the ability to acquire, assimilate, and exploit external knowledge is a key source of competitiveness for halal-oriented MSMEs. Digital capability was also found to significantly enhance both innovation capability and entrepreneurial performance, indicating that the effective use of digital technologies strengthens firms' market responsiveness, operational efficiency, and strategic flexibility. In addition, innovation capability significantly improves entrepreneurial performance, highlighting its mediating role in translating technological and knowledge-based resources into superior business outcomes. Overall, the results confirm that halal MSMEs achieve better performance when digitalization and learning capabilities are strategically integrated to support continuous innovation

From a managerial perspective, the findings suggest that Halal MSME owners and managers should prioritize investments in both digital technologies and organizational learning capabilities. Digital tools such as e-commerce platforms, social media, and data analytics should not only be adopted but also strategically integrated into daily business operations to support marketing, customer engagement, and decision making. At the same time, MSMEs must actively build absorptive capacity by engaging in continuous learning, networking, and knowledge sharing with customers, suppliers, halal certification bodies, and industry associations. Training programs, knowledge management systems, and collaborative partnerships can significantly enhance firms' ability to transform external information into innovative halal products and services.

For policymakers and halal industry stakeholders, the results imply that support programs should go beyond financial assistance and focus on digital capability building and knowledge transfer mechanisms. Government agencies, Islamic financial institutions, and halal certification bodies can play a strategic role by offering digital literacy training, innovation workshops, and platforms for knowledge exchange among halal MSMEs. Such initiatives will help MSMEs to better exploit digital opportunities, comply with halal standards, and compete more effectively in domestic and global halal markets. Despite its contributions, this study has some limitations, refers to the cross-sectional design does not capture the dynamic evolution of digital capability, absorptive capacity, and innovation over time. Future research is therefore encouraged to employ longitudinal designs and to examine other mediating or moderating

variables, such as Islamic social capital, market turbulence, or regulatory pressure, to further enrich understanding of how halal MSMEs achieve sustainable entrepreneurial performance.

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