

Relationship Between Awareness on Digitalization of Halal Management System and Product Innovation at SMEs

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Abstract

In the increasingly competitive global halal market, Small and Medium Enterprises (SMEs) are required to leverage digital technologies to enhance compliance, efficiency, and innovation. This study examines the relationship between awareness of Digital Halal Management Systems (HMS) and product innovation among halal-certified SMEs in Batu Pahat, Johor. A quantitative research approach was employed using a structured questionnaire distributed to 125 halal-certified SMEs selected through purposive sampling. Data was analyzed using SPSS through descriptive statistics, reliability analysis, normality testing, and Spearman's rank correlation. The findings indicate that SMEs demonstrate a high level of awareness of digital halal management systems ($M = 4.28$) and product innovation ($M = 4.47$). The results further reveal strong and statistically significant positive relationships between awareness dimensions digitalization, market expansion, efficiency and sustainability, and education and training and product innovation ($p < 0.01$). These findings suggest that higher awareness of digital halal systems is associated with greater innovation capability among halal SMEs. The study contributes empirical evidence to the halal digitalization literature and provides practical insights for policymakers and SME support agencies to strengthen digital readiness and Innovation performance in the halal SME sector.

1. Introduction

The halal industry in Malaysia is undergoing a rapid transformation, becoming one of the most dynamic sectors in the world due to increasing global demand across food, pharmaceuticals, cosmetics, and logistics. To remain competitive in this evolving landscape, Small and Medium Enterprises (SMEs) must leverage digital technology to ensure compliance, efficiency, and market relevance. As Malaysia positions itself as a global halal hub, digital tools like the MYeHALAL platform launched by the Department of Islamic Development Malaysia (JAKIM) have modernized the ecosystem by allowing for electronic certification and tracking.

This study focuses on how awareness of the digitalization of halal management systems (HMS) directly affects the ability of SMEs to innovate and develop new products. The Department of Islamic Development Malaysia (JAKIM) developed the MYeHALAL system since 8 February 2006 to manage halal certification electronically that allow businesses to submit application, track status and access certification documents online (Md. Sawari *et al.*, 2015). While digital transformation is essential for meeting international quality standards, many businesses find it challenging to transition from traditional paper-based processes to data-driven systems. This research specifically targets Halal certified SMEs in Batu Pahat, Johor, to explore the link between digital readiness and innovation capabilities.

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Despite the availability of digital tools such as blockchain-based traceability and online certification, many halal-certified SMEs continue to demonstrate low levels of awareness regarding these technologies. This gap in knowledge limits their ability to improve operations and hold back their capacity to create new or improved halal products (Kamarulzaman *et al.*, 2022). Furthermore, there is a lack of empirical evidence regarding how an understanding of digital HMS translates into tangible innovation outcomes, such as entering new markets or enhancing product quality.

2. Literature Review

A Halal Management System (HMS) consists of systematic processes and procedures designed to ensure that products, services, and operations comply with shariah requirements. This concept extends beyond food to include pharmaceuticals, cosmetics, and logistics. The primary goal is to guarantee that every stage of the supply chain from raw material sourcing to distribution meets stringent halal standards. Key components typically include a formal halal policy, a Halal Assurance System (HAS), staff training, and regular audits.

Digitalization has transformed HMS by increasing transparency and trust in certification. In Malaysia, the MYeHALAL platform, launched in 2006, replaced paper-based systems with an electronic process that allows for online application submission, digital status tracking, and the issuance of secure e-Certs. Furthermore, advanced technologies like Blockchain and the Internet of Things (IoT) are being integrated to provide immutable records and real-time data, which helps prevent fraud and ensures the integrity of the halal supply chain (Ab Talib *et al.*, 2022).

Digital tools enable halal SMEs to innovate both their products and their internal processes, allowing them to compete in the global market. Digital certification reduces market entry barriers, enabling firms to commercialize new products more rapidly. Programs like the Halal Technology Transformation Programme (HTTP) and PuTRA support SMEs in automating manufacturing and upgrading packaging to meet international requirements. Additionally, big data analytics help firms understand consumer preferences to optimize product development (Ahmed, 2025; The Star, 2025).

2.1 Hypotheses Development

Based on the Technology–Organization–Environment (TOE) framework and prior studies on digitalization and innovation in halal-certified SMEs, this study proposes that awareness of Digital Halal Management Systems (HMS) plays a significant role in enhancing product innovation. Greater awareness enables firms to improve operational efficiency, explore new markets, adopt sustainable practices, and leverage training opportunities, thereby contributing to stronger innovation outcomes. Accordingly, the following hypotheses are formulated:

H1: There is a significant positive relationship between awareness of digitalization in Halal Management Systems and product innovation among halal-certified SMEs.

H2: There is a significant positive relationship between awareness of market expansion enabled by digital Halal Management Systems and product innovation among halal-certified SMEs.

H3: There is a significant positive relationship between awareness of efficiency and sustainability facilitated by digital Halal Management Systems and product innovation among halal-certified SMEs.

H4: There is a significant positive relationship between awareness of education and training related to digital Halal Management Systems and product innovation among halal-certified SMEs.

2.2 Conceptual Research Framework

The framework for this study positions awareness as the independent variable and product innovation as the dependent variable, as presented in Fig 1. Higher awareness across digitalization, market expansion, efficiency, and training is hypothesized to positively influence innovation outcomes (Kamarulzaman *et al.*, 2022).

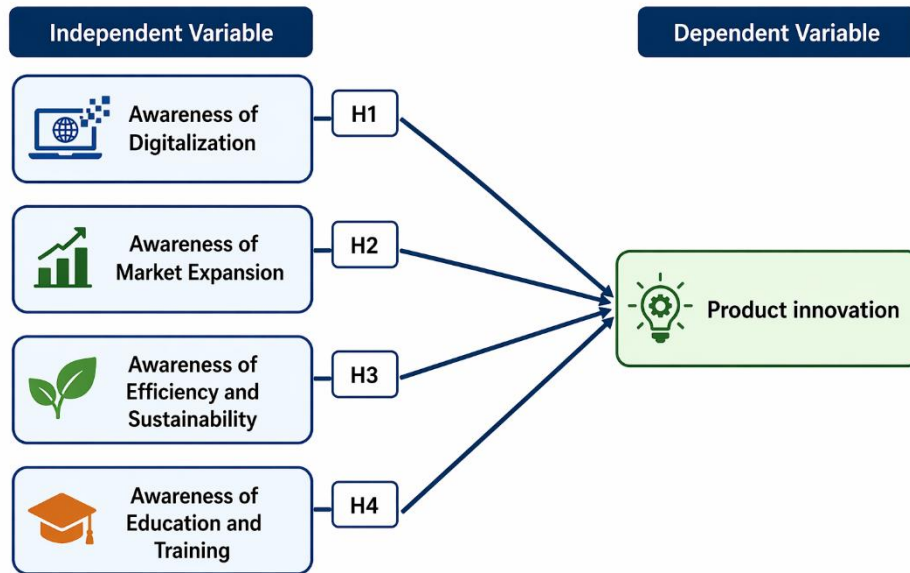


Fig. 1 Research Framework

3. Research Methodology

A quantitative research approach was adopted to collect measurable and statistical data. The study utilizes a descriptive and correlational design. Descriptive research summarizes the characteristics and awareness levels of respondents, while correlational analysis evaluates the strength and direction of the relationship between digitalization awareness and innovation outcomes. Research flow chart is provided in Fig. 2.

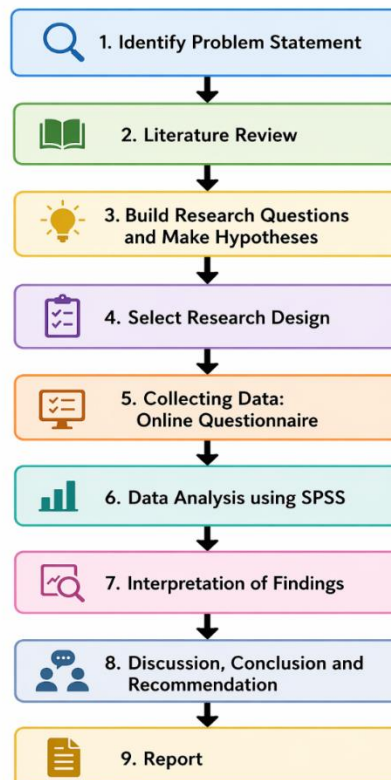


Fig. 2 Research Flow Chart

3.1 Population

This research study focuses on the population of halal-certified small and medium enterprise (SMEs) within Batu Pahat. A purposive sampling method is used to target business owners or managers of firms that had a valid halal certification and had been operation for a minimum of one year. Although the application of Cochran's formula suggested an ideal sample size of 383 respondents based on the total SME population in the state of Johor, the researcher set a more practical target of 100 to 150 SMEs for this localized investigation due to time and resource constraints. Ultimately, 125 respondents participated in the study, providing a sufficient data set for exploratory correlation and regression analysis.

3.2 Sampling

This study employed a purposive sampling technique to select respondents who met specific criteria relevant to the research objectives. The target sample consisted of owners or managers of halal-certified small and medium enterprises (SMEs) located in Batu Pahat, Johor. Only firms with a valid halal certification and a minimum of one year of operational experience were included to ensure that respondents possessed sufficient exposure to digital halal management practices and product innovation activities. Although Cochran's sample size formula indicated a larger ideal sample for generalization, practical constraints related to time and accessibility necessitated a more focused approach suitable for a localized study. Consequently, 125 halal-certified SMEs participated in the survey, which is considered adequate for exploratory correlation and regression analyses. The use of purposive sampling ensured that data was collected from respondents with relevant knowledge and experience, thereby enhancing the reliability and validity of the findings.

3.3 Research Instrument

Primary data collection instrument used in this study was a structured questionnaire divided into three sections to obtain comprehensive responses from the respondents. Section A captured the demographic profile of the respondents and their businesses, including gender, age, years of operation, and number of full-time employees. Section B was designed to measure respondents' awareness of Digital Halal Management Systems (HMS). The measurement items were adapted from established studies on digital awareness and technology adoption in halal and SME contexts (Anwar *et al.*, 2022; Dubey *et al.*, 2020) and assessed using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Section C measured product innovation dimensions by examining firms' innovation capability and digital enablement. The items for product innovation were adapted from prior innovation and SME studies (Kamarulzaman *et al.*, 2022; Indrawati *et al.*, 2020) and were also measured using a five-point Likert scale to ensure consistency and facilitate statistical analysis.

3.4 Pilot Study

A pilot study was conducted with 30 respondents to test the instrument's reliability. Refer to Table 1, the overall Cronbach's Alpha was 0.964, indicating "Excellent" internal consistency and suitability for full-scale data collection.

Table 1 Result of pilot study

Type of construct	n items	n respondents	α
Awareness of Digital Halal Management System	9	30	.918
Product Innovation Dimensions	12	30	.938
Overall	21	30	.964

3.5 Data Collection

Data for this study were collected using a structured questionnaire administered to halal-certified small and medium enterprises (SMEs) in Batu Pahat, Johor. The target respondents consisted of business owners or managers who possessed adequate knowledge of their firms' halal management practices and innovation activities. To ensure the relevance and credibility of the responses, only SMEs with a valid halal certification and a minimum of one year of operational experience were included in the study. The questionnaire was distributed online using Google Forms, which allowed for efficient data gathering within the limited time frame of the study. The online approach also facilitated wider accessibility for respondents and improved response accuracy by minimizing manual data entry errors. A total of 125 valid responses were successfully collected and deemed sufficient for statistical analysis.

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4. Results and Discussion

A total of 125 valid responses were collected from halal-certified SMEs operating in Batu Pahat, Johor. The respondents consisted of SME owners and managers who were directly involved in halal certification or product-related decision-making processes. The demographic analysis indicates a diverse representation in terms of gender, age group, years of business operation, and number of full-time employees. Most firms had been operating for more than three years, suggesting that respondents possessed sufficient experience to provide informed responses regarding digital halal management practices and product innovation. Table 2 presents the demographic profile of respondents.

Table 2 *Demographics of 125 respondents from SME in Batu Pahat*

Characteristics	<i>n</i>	%
Gender of respondent		
Male	74	59.2
Female	48	38.4
Prefer not to say	3	2.4
Age of respondent		
Below 25 years	13	10.4
25–34 years	21	16.8
35–44 years	30	24
45–54 years	50	40
55 years and above	11	8.8
Years of business operation		
Less than 1 year	19	15.2
1–5 years	53	42.4
6–10 years	41	32.8
More than 10 years	12	9.6
Number of full-time employees		
Less than 5	53	42.4
5–19	31	24.8
20–49	18	14.4
50–99	12	9.6
100 or more	11	8.8

Table 2 shows that the awareness of the digital halal management system achieved a mean of 4.28, while product innovation dimensions reached 4.47. Both scores fall into the High category, suggesting that these SMEs are actively integrating digital tools to drive innovation. Low standard deviations ($SD = 0.672$ and $SD = 0.588$) reflect a high level of consensus among respondents. Collectively, these results demonstrate a robust foundation for digital adoption in the local halal industry. The levels of digital awareness and product innovation were measured using a 5-point Likert scale, where scores between 4.21 and 5.00 are classified as High.

Table 2 *Total mean score for level of Awareness and Product Innovation*

	<i>M</i>	<i>SD</i>	Interpretation
Awareness of Digital Halal Management System	4.28	.672	High
Product Innovation Dimensions	4.47	.588	High
Overall	4.47	.588	High

Table 3 shows the normality test. The normality of the data distribution was evaluated by calculating Z-scores for skewness and kurtosis. Skewness was utilized to assess the symmetry of the distribution, with positive values indicating a right-hand tail and negative values indicating a left-hand tail. Kurtosis was examined to determine the relative peak of the distribution; specifically, leptokurtic distributions (positive values) indicate a sharp peak, while platykurtic distributions (negative values) characterize a flatter profile relative to the normal curve.

As summarized in Table 3, the SPSS analysis demonstrates that skewness values for nearly all dimensions fall within the conservative range of ± 1.0 . Similarly, kurtosis values remain within acceptable thresholds for

normality. These results verify that the constructs including awareness of digitalization and product innovation follow an approximately normal distribution, thereby satisfying the assumptions required for subsequent parametric statistical analyses.

Table 3 Normality test based on the values for skewness and kurtosis

	<i>N</i>	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	Interpretation
Awareness of Digital Halal Management System	125	4.2782	.67152	-.585	-1.141	Normal
Product Innovation Dimensions	125	4.4713	.58812	-1.139	.200	Normal
Overall	125	4.4713	.58812	-1.139	.200	Normal

Tabel 4 shows the result from correlation analysis. Spearman's rank-order correlation was employed to evaluate the relationships between awareness dimensions. Results indicate strong, positive, and statistically significant correlations across all variables, with values ranging from 0.875 to 0.97 ($p < 0.01$). The most robust association was found between market expansion and efficiency and sustainability ($\rho = 0.978$), followed by digitalization and efficiency ($\rho = 0.927$). This high degree of interrelatedness suggests that as SMEs become more informed in one digital area, their awareness typically increases across all other dimensions, supporting a holistic approach to digital adoption in the halal sector.

Table 6 Intercorrelation, Mean and Standard Deviations for Four Levels of Awareness

Variable	1	2	3	4	M	SD
Awareness of Digitalization	--	.905**	.927**	.883**	4.23	0.65
Awareness of Market Expansion	--	--	.978**	.886**	4.25	0.76
Awareness of Efficiency & Sustainability	--	--	--	.875**	4.26	0.77
Awareness of Education & Training	--	--	--	--	4.39	0.65

5. Conclusion

This study examined the relationship between awareness of Digital Halal Management Systems and product innovation among halal-certified Small and Medium Enterprises (SMEs) in Batu Pahat, Johor. Using a quantitative approach, the findings reveal that SMEs demonstrate high levels of awareness of digital halal practices and strong product innovation performance. The results further indicate that all awareness dimensions digitalization, market expansion, efficiency and sustainability, and education and training are positively and significantly related to product innovation.

These findings highlight the importance of digital awareness as a key enabler of innovation within the halal SME sector. SMEs that are more informed about digital halal systems are better positioned to enhance innovation capability, improve operational efficiency, and respond to evolving market demands. The study provides empirical support for the conceptual framework and reinforces the relevance of digital readiness in driving innovative outcomes.

From a practical perspective, the results suggest that policymakers, halal authorities, and SME support agencies should focus on strengthening awareness through targeted training programs, digital guidance, and capacity-building initiatives. By improving awareness of digital halal management systems, halal-certified SMEs can enhance their competitiveness and sustainability in an increasingly digitalized halal industry.

Despite its contributions, this study is limited by its focus on a single geographic area and the use of a cross-sectional research design. Future research may extend this work by examining broader regions, incorporating longitudinal approaches, or exploring additional factors influencing innovation in halal SMEs. Overall, this study contributes valuable insights into the role of digital awareness in supporting product innovation within the halal SME ecosystem.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Muhammad Firdaus Abdul Rejab and Anim Zalina Azizan; **data collection:** Muhammad Firdaus Abdul Rejab and Anim Zalina Azizan; **analysis and interpretation of results:** Muhammad Firdaus Abdul Rejab and Anim Zalina Azizan; **draft manuscript preparation:** Muhammad Firdaus Abdul Rejab and Anim Zalina Azizan. All authors reviewed the results and approved the final version of the manuscript.

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