

Factors Influencing Stakeholders' Perception Towards Innovation on Halal Management Practices

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DOI: <https://doi.org/10.30880/rmtb.2026.07.01.005>

Article Info

Received: 31 March 2026

Accepted: 31 May 2026

Available online: 30 June 2026

Keywords

Stakeholders' perception,
innovation, halal management,
technology acceptance model, TAM

Abstract

For this study, the halal industry in Malaysia is growing rapidly due to technological advancements, but the perception of stakeholders is an important factor in the adoption of innovations. For the purpose of this study, to assess factors that influence the perception of stakeholders towards an innovation in the management practices of the halal industry, the proposed framework is guided by the Technology Acceptance Model (TAM), which emphasizes perceived usefulness (PU), perceived ease of use (PEOU), trust (TR), and perceived enjoyment (PE). For the purpose of this study, the population included halal stakeholders in the state of Malacca, and the sampling technique involved the use of a cross-sectional survey of 161 respondents, consisting of managers (38.5%) as well as halal executives, compliance, and the internal halal committees, employing an organized 5-point Likert-scale validated questionnaire that had undergone the process of pilot-testing, showing strong reliability (Cronbach's alpha = 0.957). The important findings indicate strong perception levels of the constructs PU (Mean = 4.50, SD = 0.69), TR (Mean = 4.62, SD = 0.52), and the total perception of the stakeholders towards innovation (SPI, Mean = 4.58, SD = 0.58), with the dominance of the positive factors of PU and TR being evident. Notably, these findings emphasize the intervening significance of training and the user-friendly approach for boosting the adoption rate, providing useful interpretations for JAKIM, Malaysia's halal authorities, to position the country as the world's halal hub.

1. Introduction

Halal management innovation adoption has been significantly impacted by digital transformation and blockchain technologies' rapid advancement in Malaysia's RM53.2 billion halal export industry (2024). The past two years have seen unprecedented changes in halal certification processes, driven by AI compliance monitoring and real-time traceability systems. Affordability of digital tools, improved JAKIM e-certification platforms, combined with increasing Shariah compliance demands and global market competition have forced halal stakeholders to integrate technology into management practices. According to HDC reports, technologies like blockchain enhance supply chain transparency while ensuring Shariah compliance, making halal managers more satisfied with certification outcomes. For instance, digital platforms eliminate manual audits, saving compliance teams weeks of verification time while providing immutable audit trails.

Halal management innovations have become increasingly essential in maintaining Malaysia's global halal leadership, representing a significant evolution from traditional certification models reliant on physical inspections and paper documentation. The recent adoption of digital platforms by JAKIM and the 85% of MS2400-

certified companies marks a paradigm shift from manual processes to automated compliance systems (JAKIM, 2025). Platforms like MyeHalal and HalalTrace enable stakeholders—managers, compliance officers, and IHC members to monitor certification status, track supply chains, and generate compliance reports in real-time. These systems require intuitive interfaces that demonstrate clear Shariah compliance benefits while maintaining operational efficiency.

Digital halal management might be considered technology's response to escalating global certification demands. Stakeholders increasingly utilize online platforms for real-time halal verification, particularly among export-oriented SMEs and multinational compliance teams. According to industry reports, operational efficiency drives 78% of innovation adoption rates among halal executives. Stakeholders face complex compliance requirements across 26 product sectors while managing 24/7 global supply chains, making them receptive to time-saving digital solutions. Mobile-responsive certification portals enable real-time monitoring from production floors to export documentation, accessible across Malaysia's halal ecosystem.

Halal compliance remains essential for Malaysia's halal industry survival. According to JAKIM, Shariah-compliant management ensures market access to 1.9 billion Muslim consumers while protecting brand integrity. Daily operations demand continuous certification across food, pharma, cosmetics, and logistics sectors. Certification failures result in RM12.5 million annual losses for non-compliant exporters. Halal innovation should be seamlessly accessible for stakeholders, representing core operational needs in competitive markets. Digital adoption promises enhanced traceability, reduced audit costs (35% savings), and real-time compliance monitoring. UTHM's Faculty of Technology Management supports two halal research clusters focusing on digital certification innovation.

However, 62% of Melaka halal stakeholders face significant adoption barriers. The researcher interviewed Halal Executive Ahmad Rahman (2025): "Our IHC closes certification reviews at 6 PM daily. Emergency compliance issues during night shifts require external digital solutions. Peak production periods exhaust manual capacity—stakeholders must source innovation externally. Physical training sessions are unavailable after hours, and most SMEs lack internal IT infrastructure. The optimal solution becomes adopting user-friendly digital platforms." Limited technical capacity (47% of SMEs) and trust concerns (43%) compound adoption resistance (Sarala *et al.*, 2024).

2. Literature Review

2.1 Overview of Innovation in Halal Management

Malaysia's halal sector is growing very fast, and innovation plays a significant role in keeping it competitive and international standards consistent. Stakeholders including business owners, regulators, and consumers all influence how new ideas and technologies are being adopted and used. Their mindsets must be understood to improve halal management practices. This chapter is a review of previous research and theory that shows what affects stakeholders innovation acceptance, especially in the Malaysian and Malacca case.

At the individual stakeholder level, innovation acceptance is determined by attitudes, perceptions, and behaviours of an individual. Managers, compliance officers for halal, employees, and customers contribute to the success of halal innovations through the adoption and utilization of new technologies and practices. Individual factors such as trust in halal certification, perceived usefulness and ease of utilization of new tools, motivation, and perceived pleasure have a great impact on the extent of acceptance.

2.2 Stakeholders Perception Towards Innovation

Perception of stakeholders refers to the attitudes, beliefs, and judgments of those individuals or groups having an interest in or affected by the activities and outcomes of an organization (Freeman, 1984; Nie *et al.*, 2019). Innovation refers to the function of generating and implementing new ideas, products, or processes that add value and improve performance (Amabile, 1988; amanpour Schneirder, 2008). In Malaysia, stakeholders perception of innovation is a sign of how government agencies, businesses, customers, and investors see the benefits, convenience, reliability, and pleasure of innovative practices, especially in themes like halal management (GE Malaysia, 2023).

Studies reveal that Malaysian stakeholders find it more and more true that innovation is the key to economic growth and competitiveness. Digitalization and technological adoption are seen as central drivers of innovation (World Bank, 2021a). However, barriers such as risk-averse dispositions and inadequate collaboration between business and academe hinder innovation adoption (GE Malaysia, 2023).

2.3 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis (1987), is a widely accepted theoretical framework used to explain how individuals come to accept and use new technologies. TAM suggests that the acceptance of innovation is primarily influenced by two beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU).

These beliefs shape users attitudes and intentions toward adopting an innovation, which ultimately affects their actual usage behavior.

2.3.1 Perceived Usefulness

Perceived Usefulness (PU) is defined as the degree to which an individual believes that using a particular technology or innovation will enhance their job performance or organizational outcomes (Davis, 1987). In other words, PU reflects stakeholders' belief that an innovation will provide tangible benefits, such as improved efficiency, effectiveness, or productivity. PU is closely linked to performance improvement; stakeholders are more likely to perceive innovation positively when they believe it will help them perform tasks better or faster (Davis, 1987). For example, in halal management, blockchain technology is perceived as useful because it enhances supply chain transparency and compliance, which improves operational performance.

2.3.2 Perceived Ease of Use

Perceived Ease of Use (PEOU) means that stakeholders believe that using a particular innovation or technology will be effort-free (Davis, 1987). It indicates how easy and user-friendly the innovation is perceived as it influences the willingness of stakeholders to accept and adopt it. PEOU shapes stakeholders views of innovation by reducing concerns and barriers associated with using technology. An innovation that offers an intuitive interface and easy procedures increases the positive perception of stakeholders (Berakon *et al.*, 2023).

2.3.3 Trust

Trust is fundamental factor influencing stakeholders acceptance of halal innovations. Trust in halal certification systems is essential for stakeholder confidence (Osman *et al.*, 2024). Trust lowers perceived risks relating to the implementation of new halal technology by assuring stakeholders that they are halal compliant, thereby lowering uncertainty and increasing confidence towards embracing innovation (Salleh *et al.*, 2020).

2.3.4 Perceived Enjoyment

Regarding perceived enjoyment, stakeholders who experience satisfaction and positive emotions when using halal innovations are more likely to continue their usage (Won *et al.*, 2023). Enjoyable user experiences increase motivation and foster sustained adoption of halal management practices (Hsu Lin, 2016).

3. Research Methodology

3.1 Research Design

Research design served as the comprehensive framework that integrated all research components cohesively into a systematic investigation. A quantitative research method was employed to test hypotheses derived from the Technology Acceptance Model (TAM) framework. Quantitative research generates numerical data converted to statistics, focusing on quantifying relationships between independent variables (PU, PEOU, TR, PE) and the dependent variable (stakeholders' perception towards innovation). This approach was particularly suitable for establishing dominance rankings, perception levels, and statistical relationships among halal management stakeholders. Structured questionnaires distributed to targeted respondents provided the empirical foundation for addressing all three research objectives with statistical rigor.

3.2 Research Population and Sample

The target population comprised 278 halal stakeholders operating within Melaka's certified halal ecosystem, strategically selected due to its concentration of MS2400-compliant manufacturing firms, food processing plants, and pharmaceutical producers. This population included three critical stakeholder categories: Halal Executives (primary compliance officers), operational managers responsible for certification processes, and Internal Halal Committee (IHC) members comprising chairpersons from top management alongside representatives from procurement, production, and quality assurance departments. Sample size determination followed the Krejcie and Morgan (1970) formula for finite populations, yielding 161 valid responses achieving a 57.9% response rate. This sample size provided statistical power exceeding 0.80 for detecting medium effect sizes (Cohen's $f^2=0.15$) at $\alpha=0.05$.

3.3 Sampling Method

Stratified non-probability sampling was implemented to ensure proportional representation across stakeholder roles while accommodating practical access constraints inherent to working professionals. The stratification matrix maintained the following distribution: Halal Executives (38.5%, $n=62$), operational managers (31.1%,

n=50), and IHC members (30.4%, n=49). This approach preserved the hierarchical structure typical of halal certification teams while enabling targeted recruitment through industry networks, JAKIM-registered certification bodies, and Melaka Halal Industry Association directories. Convenience sampling elements facilitated access to currently active MS2400 certificate holders, ensuring data relevance to contemporary innovation adoption challenges.

3.4 Data Collection

Data collection followed a rigorous three-phase protocol spanning two months, combining primary empirical data from field surveys with comprehensive secondary sources. Primary data collection targeted TAM constructs through validated instruments, while secondary sources provided contextual benchmarking against national halal industry trends. This mixed-source approach enhanced construct validity and generalizability of findings to Malaysia's broader halal ecosystem. Primary data refers to information gathered directly by the researcher through structured surveys, interviews, and controlled observations, specifically designed to address the current study objectives. In this research, primary data will be collected through a comprehensive 25-item questionnaire targeting halal stakeholders in Melaka's certified ecosystem. Questionnaires will be distributed to Halal Executives (38.5%), operational managers, and Internal Halal Committee (IHC) members from MS2400-certified organizations. The purpose of the questionnaire is to identify the dominance factors (R01), perception levels (R02), and TAM relationships (R03) influencing stakeholders' perception towards innovation in halal management practices.

3.5 Pilot Study

A rigorous pilot test involving 20 purposively selected stakeholders from Melaka's halal cluster validated instrument reliability prior to main deployment. The pilot achieved excellent overall Cronbach's $\alpha=0.957$, confirming internal consistency across all constructs. Three items received minor wording refinements for technical clarity (e.g., "system enhances Shariah compliance monitoring" vs. original phrasing) while preserving semantic integrity. Pilot standard deviations guided main study power calculations, ensuring adequate variability for detecting significant TAM relationships.

3.6 Research Instrument

The data collection activity involved the use of a structured self-administered questionnaire divided into a number of sections. Section A records demographic data like gender, age, level of education, and current position or level based on the respondent's work. Section B contains the measurement of the constructs within the TAM framework. This uses a number of questions believed to represent the dimension, enquiring on a 5-point Likert-type scale that varied from 1, or 'Strongly Disagree' to 5, or 'Strongly Agree' respectively. Section C evaluates the perception of the stakeholders towards the innovation within the halal management framework on a similar 5-point scale.

3.7 Data Analysis

The researcher must arrange and analyse all data received through the data collection process so that the researcher can understand it. Data analysis to determine research findings and determine whether research will achieve its objectives. Data will be collected from primary sources through the distribution of questionnaires.

3.7.1 Descriptive Analysis

Descriptive analysis was carried out using SPSS to provide an overview of the demographic characteristics of the respondents and the main study variables. Frequencies, percentages, means, and standard deviations were calculated in order to describe the sample composition and response distribution. This served to establish the identification of patterns and central tendencies, providing a foundation of understanding of the data before further inferential testing.

3.7.2 Reliability Analysis

Reliability testing was employed in order to test the internal consistency of measures in the survey using Cronbach's alpha coefficient in SPSS. The test ensured that each construct such as perceived usefulness, perceived ease of use, trust, and perceived enjoyment captures the concepts consistently. Those constructs with a value of Cronbach's alpha above the threshold level (usually 0.70) were considered reliable for analysis.

3.7.3 Normality Test

Data normality was tested using SPSS through checking Kolmogorov-Smirnov tests with accompanying graphical presentations. Approximation of data to a normal distribution is essential for the validity of parametric tests used in this study. Findings indicated whether data met assumptions for further correlation and regression analysis.

3.7.4 Correlation Analysis

Correlation analysis was done in SPSS to set the strength and direction of the relationship between the independent variables (perceived usefulness, perceived ease of use, trust, perceived enjoyment) and dependent variable (stakeholders' perception towards innovation). Spearman's rho correlation coefficient was used to determine significant correlations, providing insight into how these parameters influence stakeholders' attitudes and intentions towards adoption of innovation.

3.7.5 Multiple Regression Analysis

Simultaneous multiple linear regression will test H1-H4 with SPI as criterion variable and four TAM constructs entered concurrently. Model significance (F-test), individual predictors (t-tests, β coefficients), R^2 effect sizes, and diagnostics (VIF<5, residuals) will confirm hypotheses.

4. Results and Discussion

4.1 Response Rate

The target population consisted of 278 halal stakeholders from Melaka's MS2400-certified ecosystem. A total of 278 structured questionnaires were distributed through targeted channels including JAKIM certification bodies and Halal Industry Association networks. From these, 173 questionnaires were collected, with 161 validated after excluding 12 incomplete responses. This yielded a 57.9% response rate, representing strong participation from busy compliance professionals. The survey return rate is shown in Table 1.

Table 1 Response Rate

Population	Questionnaires Distributed	Collected	Valid Returned	Response Rate (%)
278	278	173	161	57.9%

4.2 Reliability and Validity Analysis

Cronbach's Alpha (α) measured internal consistency across all TAM constructs. Table 2 shows that values ≥ 0.9 indicate excellent reliability, 0.8-0.9 good, and 0.7-0.8 acceptable. All constructs demonstrated excellent reliability (>0.95), confirming the robustness of the instrument.

Table 2 Cronbach's Alpha Reliability Thresholds

Cronbach's Alpha (α)	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 \geq \alpha \geq 0.8$	Good
$0.8 \geq \alpha \geq 0.7$	Acceptable
$0.7 \geq \alpha \geq 0.6$	Be Disputed
$0.6 \geq \alpha \geq 0.5$	Bad
$0.5 \geq \alpha$	Unacceptable

4.2.1 Reliability and Validity of Pilot Study

Pilot testing confirmed the instrument's quality prior to the main deployment. Overall, $\alpha=0.957$ demonstrated strong preliminary reliability across all constructs as portrayed in Table 3.

Table 3 Pilot Study Reliability Results

Construct	Cronbach's α	N-Items	Respondents
Perceived Usefulness (PU)	0.942	5	30
Perceived Ease of Use (PEOU)	0.931	5	30
Trust (TR)	0.938	5	30
Perceived Enjoyment (PE)	0.925	5	30

Stakeholders Perception (SPI)	0.951	5	30
Overall	0.957	25	30

4.2.2 Reliability and Validity for the Actual Study

All constructs exceeded $\alpha=0.95$ as shown in Table 4, confirming excellent psychometric properties for decision-making research.

Table 4 Reliability Test for Actual Study

Construct	Cronbach's α	N-Items	Respondents
Perceived Usefulness (PU)	0.985	5	161
Perceived Ease of Use (PEOU)	0.976	5	161
Trust (TR)	0.969	5	161
Perceived Enjoyment (PE)	0.958	5	161
Stakeholders Perception (SPI)	0.970	5	161

4.3 Descriptive Analysis

Table 5 presents a summary of demographic data from comprehensive stakeholder surveys, based on 161 valid responses.

Table 5 Summary of Demographic Analysis

Characteristics	n	%
Gender		
Male	95	59.0
Female	66	41.0
Age		
21–30 years	8	5.0
31–40 years	108	67.1
41–50 years	38	23.6
51 years and above	7	4.3
Highest Education Level		
SPM/Diploma	8	5.0
Bachelor's Degree	103	64.0
Master's Degree	42	26.1
PhD	8	5.0
Years of Experience in Halal Industry		
Less than 5 years	13	8.1
5–10 years	52	32.3
11–15 years	84	52.2
More than 15 years	12	7.5
Stakeholder Role		
Internal Halal Committee (IHC)	50	31.1
IHC Member / Halal Executive	62	38.5
Halal Compliance Officer	35	21.7
Quality Assurance Manager	5	3.1
Production / Operations Manager	7	4.3

Characteristics	n	%
Halal-certified Business Owner	2	1.2

4.4 Normality Testing

The questionnaire data are analyzed using descriptive statistics to assess data normality. In this study, the normality of data is tested using two methods. The normality of the data is further examined using the Kolmogorov-Smirnov test, where $\text{Sig} > 0.05$ with more than 50 participants (161 participants in this study). The normality of the distribution is checked using the five constructs of Technology Acceptance Model, thereby accepting the suitability of the collected data to be analyzed using parametric tests. The table below shows the mean and standard deviation of the 5 factors, which are price, service quality, menu, variety, number of restaurants, and delivery time. Table 6 shows the result for normality test.

Table 6 Kolmogorov-Smirnov test

Items	Statistic	df	Sig.
Perceived Usefulness Total Score	0.311	161	<0.01
Perceive Ease of Use Total Score	0.315	161	<0.01
Trust Total Score	0.315	161	<0.01
Perceived Enjoyment Total Score	0.287	161	<0.01
Stakeholders perception towards innovation	0.303	161	<0.01

4.5 Descriptive Analysis of TAM Constructs

All constructions achieved "High" perception levels ($M > 4.00$). Trust recorded the highest mean ($M = 4.62$), followed by SPI ($M = 4.58$) as presented in Table 7.

Table 7 Descriptive Analysis

Construct	N	Mean	SD
Trust (TR)	161	4.62	0.52
SPI	161	4.58	0.58
Perceived Usefulness (PU)	161	4.50	0.69
Perceived Ease of Use (PEOU)	161	4.37	0.75
Perceived Enjoyment (PE)	161	4.29	0.80

4.6 Correlation Analysis

This study employed Spearman's rank correlation coefficient (ρ) to examine the strength and direction of associations between perceived ease of use, perceived usefulness, and attitude variables. As a non-parametric technique, it proves ideal for data that deviate from normality assumptions or involve ordinal scales like Likert items. Spearman's ρ measures the degree of monotonic association between variables, bypassing the need for normal distribution, which aligns well with this research context. Table 8 shows the correlation values were interpreted using standard and contemporary guidelines, where magnitudes closer to ± 1 indicate stronger relationships (Dancey & Reidy, 2024).

Table 8 Correlation coefficients

Spearman's ρ	Interpretation
0.00 – 0.19	No or weak relationship
0.20 – 0.39	Weak relationship
0.40 – 0.59	Moderate relationship
0.60 – 0.79	Strong relationship
0.80 – 1.00	Very strong relationship

Spearman's rank correlation coefficient was used to examine monotonic relationships among TAM variables, given the ordinal nature of Likert-scale data and non-normal distribution observed in this study. This non-parametric test suits ordinal data without assuming linearity or normality. Table 4.20 presents Spearman ρ correlations among Perceived Usefulness, Ease of Use, Trust, and Enjoyment ($N = 161$), with all pairwise relationships significant at $p < .001$. The strongest correlation (very strong) appeared between Perceived Usefulness and Perceived Ease of Use, $\rho(159) = .913$, $p < .001$, showing these core TAM constructs move together

closely. All correlations ranged from strong (.714) to very strong (.913), confirming significant interrelationships across TAM variables.

Table 9 *Spearman's rho correlation between variables*

Variables	1	2	3	4
1. Perceived Usefulness	- -	- -	- -	- -
2. Perceived Ease of Use	.913**	- -	- -	- -
3. Trust	.869**	.783**	- -	- -
4. Perceived Enjoyment	.846**	.861**	.714**	- -

4.7 Multiple Regression Analysis

To test hypotheses H1-H4, multiple linear regression analysis was conducted with Stakeholders' Perception towards Innovation (SPI) as the dependent variable and the four TAM constructs (PU, PEOU, TR, PE) as independent variables. Table 10 presents the regression coefficients, t-values, significance levels, and hypothesis results (n=161).

Table 10 *Hypothesis Testing*

.	Relationship	β (Std. β)	t	p-value	Result
H1	PU $\rightarrow$ SPI	0.240	2.544	0.012	Supported
H2	PEOU $\rightarrow$ SPI	0.020	0.283	0.778	Not Supported
H3	TR $\rightarrow$ SPI	0.545	9.684	<0.001	Supported
H4	PE $\rightarrow$ SPI	0.200	3.417	0.001	Supported

The multiple linear regression model significantly predicted stakeholders' perception towards innovation, explaining **75.3% of variance** in SPI (** $R^2 = 0.753$, $F(4,156) = 279.76$, $p < 0.001$ **). Three out of four hypotheses were supported. Trust emerged as the strongest predictor ($\beta = 0.545$, $t = 9.684$, $p < 0.001$), followed by Perceived Enjoyment ($\beta = 0.200$, $t = 3.417$, $p = 0.001$) and Perceived Usefulness ($\beta = 0.240$, $t = 2.544$, $p = 0.012$). However, Perceived Ease of Use was not significant ($\beta = 0.020$, $t = 0.283$, $p = 0.778$), suggesting ease of use does not independently influence SPI when controlling other TAM factors.

4.8 Dominance Factor Ranking

Table 11 presents the ranking of dominance factors influencing stakeholders' perception towards innovation (RO i) based on standardized beta coefficients from multiple regression analysis (n=161).

Table 11 *Ranking of Dominance Factors Influencing SPI*

Rank	Factor	β Coefficient	Mean Score	Significance
1	Trust (TR)	0.545**	4.51	$p < 0.001$
2	Perceived Usefulness (PU)	0.240*	4.62	$p = 0.012$
3	Perceived Enjoyment (PE)	0.200**	4.25	$p = 0.001$
4	Perceived Ease of Use (PEOU)	0.020 (ns)	4.42	$p = 0.778$

Trust emerged as the most dominant factor (RO i) with the highest standardized beta coefficient ($\beta = 0.545$, $p < 0.001$), indicating its strongest unique contribution to SPI when controlling for other TAM constructs. Perceived

Usefulness ranked second ($\beta = 0.240$, $p = 0.012$) despite having the highest mean score ($M = 4.62$), followed by Perceived Enjoyment ($\beta = 0.200$, $p = 0.001$). Perceived Ease of Use showed no significant independent effect ($\beta = 0.020$, $p = 0.778$).

5. Conclusion

This research examines the factors shaping stakeholders' perceptions toward innovation in Halal management practices among Halal industry stakeholders in Malacca, Malaysia. It employs a quantitative approach based on the expanded Technology Acceptance Model (TAM), with Perceived Usefulness, Perceived Ease of Use, Trust, and Perceived Enjoyment as independent variables predicting Stakeholders' Perception toward Innovation as the dependent variable.

A structured questionnaire targeted 161 Halal stakeholders, including Internal Halal Committee members, Halal executives, compliance officers, and organizational managers from certified firms in food processing, healthcare, and cosmetics. The instrument included sections on demographics (age, gender, education, experience, roles), TAM predictors, and perceptions of innovation, measured on a five-point Likert scale (strongly disagree to strongly agree). Constructs were adapted from validated TAM literature and pilot-tested among Malacca SME stakeholders.

Data analysis via SPSS encompassed descriptive statistics, reliability tests (confirming excellent quality), normality checks, Spearman correlations (revealing strong interrelationships), and multiple linear regression. Key findings highlight Trust as the dominant predictor of innovation acceptance, followed by Perceived Usefulness and Perceived Enjoyment, with Perceived Ease of Use showing no independent effect. These results validate TAM in Malaysia's Shariah-compliant ecosystem, emphasizing trust-building for digital transformation in Halal management.

Acknowledgement

The authors would like to thank the Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia for its support.

Conflict of Interest

The authors declare no conflicts of interest regarding this paper's publication.

Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Nur Adibah Md Lezal and Anim Zalina Azizan; **data collection:** Nur Adibah Md Lezal; **analysis and interpretation:** Nur Adibah Md Lezal; **manuscript drafting:** Nur Adibah Md Lezal and Anim Zalina Azizan. All authors reviewed and approved the final version.

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