# Digital Technology Acceptance Among MSMEs in Northern Malaysia: Evidence on the Moderating Role of Perceived Security

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## ABSTRACT

This study examines the determinants of digital technology acceptance among micro, small, and medium enterprises (MSMEs) in northern Malaysia. Drawing on the information system success model (ISSM), this research investigates the effects of information quality (IQ), system quality (SysQ), and service quality (SQ) on digital technology acceptance (DTA) with its moderator which is perceived security (PS). Data were collected from MSME operators across Perlis, Kedah, and Penang using a structured questionnaire, and the analysis was conducted using SPSS version 25.0 and partial least squares structural equation modelling (PLS-SEM). The findings reveal that IQ significantly influences DTA ($\beta = 0.283$, $p < 0.001$), indicating that accurate, relevant, and timely information enhances users' confidence in adopting digital technologies. SysQ emerged as the strongest predictor of DTA ($\beta = 0.403$, $p < 0.001$), highlighting the importance of reliability, usability, and efficiency in digital systems. SQ also demonstrated a significant positive effect on DTA ($\beta = 0.077$, $p = 0.031$). Furthermore, PS significantly moderates the relationships between SysQ and DTA ($\beta = -0.132$, $p = 0.007$) and between SQ and DTA ($\beta = 0.126$, $p < 0.001$), although it does not moderate the relationship between IQ and DTA. Overall, the study extends existing technology acceptance literature by integrating quality dimensions and perceived security within the MSME context. The findings provide valuable insights for policymakers and practitioners in designing effective digitalisation strategies to strengthen technology adoption among MSMEs in emerging economies.

**Keywords:** Digital technology acceptance (DTA), Information System Success Model (ISSM), MSMEs, Perceived security (PS), Partial least squares structural equation modelling (PLS-SEM)

## INTRODUCTION

Digital transformation has become an essential strategic priority for businesses worldwide, particularly among micro, small, and medium enterprises (MSMEs) seeking to enhance operational efficiency, competitiveness, and long-term sustainability. In other words, digital technologies have the potential to streamline production processes, reduce operational costs, and improve product quality, thereby enhancing overall efficiency and competitiveness (Mudau et al., 2024). The emergence of new technologies such as cloud computing, communication platforms, data analytics, big data, automation, robotics, artificial intelligence, machine learning, virtual reality, and 3D printing offers significant opportunities for small enterprises (Ulas, 2019). In Malaysia, digitalization has been strongly promoted through various national initiatives and policies aimed at strengthening the digital economy and improving the resilience of MSMEs. This transformation presents a dual challenge: while digitalisation offers significant opportunities for productivity enhancement and market expansion, it simultaneously exposes structural weaknesses in firms with limited technological capabilities (Othman, 2025). As MSMEs contribute significantly to employment generation, economic growth, and national development, the successful adoption of digital technology is increasingly viewed as a critical factor for business survival and competitiveness in the modern economy.

Despite the growing importance of digitalization, many MSMEs in Malaysia continue to experience difficulties in adopting digital technologies effectively. Several challenges, including limited financial resources, insufficient

digital knowledge, inadequate technological infrastructure, and resistance to organizational change, have hindered the level of digital technology acceptance among MSMEs. This can be proved by Alfian et al. (2025) stated that limited resources led to MSMEs face more issues than big companies in this unpredictable business environment. These challenges are more apparent among businesses operating in northern Malaysia, particularly in the states of Kedah, Perlis, and Penang, where disparities in technological readiness and digital capability still exist among enterprises. Although the Malaysian government has introduced numerous initiatives, grants, and digital support programs to encourage digital adoption, the implementation and acceptance of digital technology among MSMEs remain inconsistent. This situation highlights the need to better understand the factors influencing digital technology acceptance within the MSME sector.

Previous studies on technology acceptance have widely applied the information systems success model (ISSM) to explain user acceptance and system utilization behavior. ISSM focuses on system quality, information quality, and service quality as determinants of information system success. However, limited studies have integrated ISSM as a single framework to examine digital technology acceptance among MSMEs in the Malaysian context, especially in northern Malaysia. Therefore, this study aims to examine the determinants of digital technology acceptance among MSMEs in northern Malaysia by integrating the constructs of information quality, service quality, and system quality. By focusing on MSMEs operating in these regions, this study seeks to provide empirical evidence regarding the key factors influencing digital technology acceptance. The findings are expected to contribute to the existing literature on digital technology acceptance while also offering practical insights for policymakers, government agencies, and MSME owners in developing more effective strategies to enhance digital transformation and technological readiness among MSMEs.

# LITERATURE REVIEW

## Underpinning Theory

Recent empirical studies on technology acceptance have increasingly applied a partial information systems success model (ISSM) approach by focusing primarily on the quality dimensions to explain pre-adoption behaviour. For instance, Tan et al. (2023) and Nguyen et al. (2024) reported this quality dimensions significantly influence users' intention to adopt digital technologies in business settings. More recent studies further support the relevance of ISSM in digital transformation research. For example, a study integrating the DeLone and McLean ISSM with the Unified Theory of Acceptance and Use of Technology (UTAUT) found that information quality, system quality, and service quality significantly influenced trust and intention to use accounting software among MSMEs (Dewi et al., 2025). In addition, recent digital transformation literature highlights that MSMEs increasingly depend on high-quality digital systems to improve operational efficiency, innovation capability, and long-term competitiveness. Studies by Wang & Zhang (2025) revealed that digital adoption and digital culture significantly contribute to innovation performance and sustainable competitive advantage among SMEs. Furthermore, research focusing on Malaysian MSMEs emphasized that digital transformation readiness, intelligent systems adoption, and strategic digital intervention frameworks are becoming essential determinants of organizational sustainability and business resilience (Iqbal & A. Rahim, 2025). Therefore, ISSM remains an appropriate underpinning theory for examining digital technology acceptance among MSMEs.

## Independent variables

In this study, the independent variables are conceptualized based on established technology adoption model such as information system success model (ISSM) with its moderator; perceived security. These variables are believed to influence the adoption of digital technologies for operations activity. Prior literature suggests that digital transformation success among MSMEs is strongly associated with the quality and reliability of digital systems and services (Kallmuenzer et al., 2025).

## Information Quality (IQ)

IQ is described as the quality of the output that users can produce by the IS and related variables are accuracy, completeness, consistency, understandability, format, and relevance. IQ can also be described as current, good, valuable, and accurate information (Ali & Warraich, 2023). This can be said that MSMEs are more likely to

adopt digital technologies when the information provided by the system is reliable and relevant to business operations. Another recent study on accounting software adoption among MSMEs found that information quality significantly affects trust and behavioural intention to use digital systems (Dewi et al., 2025). Thus, the following hypothesis has been formulated regarding information quality.

H1: The IQ has a positive influence on DTA.

**System Quality (SysQ)**

System quality (SysQ) is referred to as the usability features of the system that include access, ease of use, navigation, reliability, efficiency, and flexibility of a system (Ali & Warraich, 2023). Furthermore, system quality (SysQ) evaluates the specifications for an information system, such as the user interface system (Montipat N. & Tanapon J., 2023). Recent literature on digital transformation indicates that SMEs are more inclined to adopt digital technologies when systems are user-friendly, efficient, and capable of supporting business operations effectively. Studies by Wang & Zhang (2025) also revealed that system quality positively influences digital innovation and organizational performance among SMEs undergoing digital transformation. The following hypothesis is put forth regarding system quality in light of the evidence.

H2: The SysQ has a positive influence on DTA.

**Service Quality (SQ)**

The individual consumers' perception of the dependability, empathy, and responsibility of mobile payment application providers is referred to as service quality (Montipat N. & Tanapon J., 2023). Prior research stated that service quality mostly concerned with the quality-of-service delivery to customers, has received considerable attention in the literature, especially from a marketing perspective. The second research stream has been promoted by the quality and operations management literature, and it probes the association between quality management solutions and organizational quality outcomes. Such an approach provides a more holistic view of quality in service organizations and posits that organizations can improve their quality outcomes by emphasizing quality management practices. In the context of MSMEs, quality service support can reduce operational uncertainty and improve confidence in digital platforms. Recent studies also confirmed that service quality significantly contributes to trust formation and actual usage of digital systems among SMEs (Dewi et al., 2025). Therefore, the hypothesis is stated as below.

H3: The SQ has a positive influence on DTA.

**Moderator variable: perceived security (PS)**

Perceived security has been shown to significantly influence technology adoption in some contexts, where MSMEs with higher security awareness are more likely to adopt digital tools. Perceived security (PS) is often conceptualized as the extent to which users believe that adopting a technology will safeguard them from risks such as fraud, data loss, or privacy breaches (Safira et al., 2026). Prior research demonstrates that perceived security can enhance technology acceptance by fostering trust. Recent digital transformation studies indicate that cybersecurity concerns and trust issues remain among the primary barriers to digital technology adoption among MSMEs (Wang & Zhang, 2025). MSMEs with stronger perceptions of security are more likely to trust digital platforms and integrate digital technologies into their operations. Moreover, recent studies emphasized that security assurance strengthens the relationship between system quality dimensions and technology acceptance behavior by reducing perceived risk and uncertainty (Dewi et al., 2025). Given the above, the moderator hypothesis was proposed.

H4a: There is a moderation effect between PS towards IQ and DTA.

H4b: There is a moderation effect between PS towards SysQ and DTA.

H4c: There is a moderation effect between PS towards SQ and DTA.

Overall, the framework of this study is shown in Figure 1.

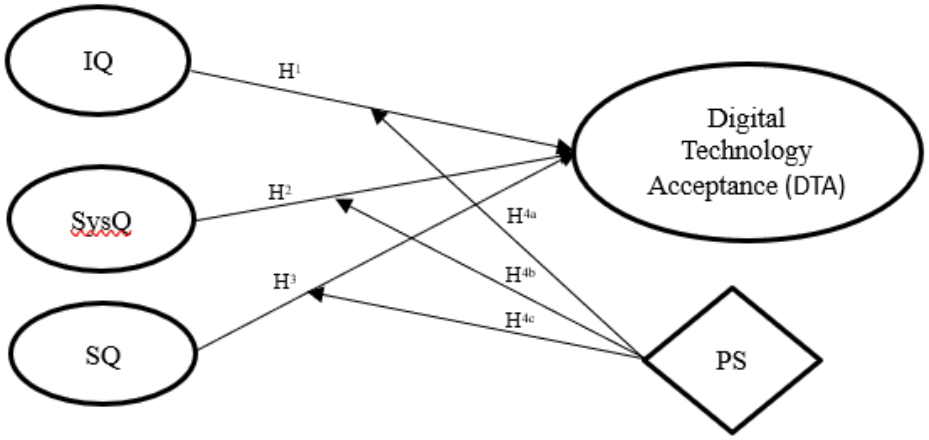


Figure 1: Research Framework of The Study

## METHODOLOGY

### Data Collection and Population

The study using quantitative analysis to examine the factors that influence the decision to digital technology acceptance. The study population MSMEs operating in the states of Perlis, Kedah, and Penang in Malaysia. The questionnaire was primarily disseminated via online, allowing 189 respondents to complete and submit their responses electronically, while physical distribution about 11 questionnaires was employed to reach MSMEs with limited online accessibility. Additionally, 200 of questionnaire were completed and returned. Of these, 200 were resulting in an effective recovery rate of 100%.

### Questionnaire Development

The study adopted a descriptive research design using a quantitative approach, with data collected through a structured questionnaire. To enhance the validity and reliability of the questionnaire, expert verification is conducted. This step helps ensure that the instrument effectively captures the variables of interest and reduces the risk of measurement errors (Hair et al., 2024). The development of these questionnaires necessitates careful consideration to ensure they effectively capture the data required to answer the research questions. A well-established scale can measure variables more accurately. The questionnaire in this paper was designed strictly with the principles of scale development to ensure content validity, and can ensure that their questionnaire effectively captures the necessary data for robust empirical analysis.

## RESULT AND FINDING

To conduct this study, the background description includes the respondents' gender, position, company age, company size, and type of MSME. Table 1 presents a comprehensive overview of the specific information.

Table 1: Descriptive Statistics of Respondents

| Constructs | Substance | Frequency | Percent (%) |
|---|---|---|---|
| Gender | Male | 96 | 48.50 |
| | Female | 104 | 51.50 |
| Position | Operations Supervisor | 51 | 25.50 |
| | Quality Control Supervisor | 29 | 14.50 |
| | Team Lead | 55 | 27.50 |
| | Employee | 65 | 32.50 |
| Company Age | 1-3 years | 89 | 44.50 |
| | 4-6 years | 78 | 39.00 |
| | 6 years and above | 33 | 16.50 |
| Company Size | Micro (Less than 10 employees) | 97 | 48.50 |

| | | | |
|---|---|---|---|
| | Small (10-49 employees) | 98 | 49.50 |
| | Medium (50-249 employees) | 5 | 2.50 |
| Type of MSME | Services | 86 | 43.00 |
| | Agriculture | 105 | 52.50 |
| | Manufacturing | 9 | 4.50 |
| | Construction | 152 | 76.00 |

The demographic profile of respondents, as presented in Table 1, the respondents were relatively balanced, with females accounting for 51.5% and males 48.5%, indicating inclusive participation in MSME operations and management. Regarding job position, the majority of respondents were employees (32.5%) and team leaders (27.5%), followed by operations supervisors (25.5%) and quality control supervisors (14.5%), suggesting that the data were largely obtained from individuals directly involved in daily operational and decision-making activities related to digital technology usage.

With respect to company age, most firms had been operating for 1–3 years (44.5%) and 4–6 years (39.0%), while only 16.5% had operated for more than six years. In terms of company size, micro and small enterprises constituted the majority of the sample, accounting for 48.5% and 49.5%, respectively, while medium enterprises represented only 2.5%. Geographically, the respondents were primarily from Kedah (52.5%) and Perlis (43.0%), with a small representation from Penang (4.5%), reflecting the study's focus on northern Malaysia. In terms of industry type, the services sector recorded the highest participation at 76.0%, followed by agriculture (16.5%), construction (5.0%), and manufacturing (2.5%).

**Normality Test**

This study assessed the normality of the data distribution for each variable analysed to ensure the suitability of the dataset for subsequent statistical procedures. The data were considered to meet the normality assumption when skewness values fell within the range of −2 to +2 and kurtosis values within −7 to +7, as recommended in recent methodological guidelines (Hair et al., 2024; Tabachnick & Fidell, 2025). Descriptive statistics, including skewness and kurtosis, were generated using SPSS version 25, and the results are reported in Table 2. These results confirm that the dataset satisfies the normality criteria and is appropriate for further advanced statistical analysis.

Table 2: The Result of Normality Analysis

| Variable | Mean | Standard deviation | Skewness | S. E | Kurtosis | S. E | Normal distribution |
|---|---|---|---|---|---|---|---|
| IQ | 3.1940 | .62988 | -.003 | .172 | -.327 | .342 | Yes |
| SQ | 3.2380 | .57183 | .174 | .172 | .315 | .342 | Yes |
| SysQ | 3.1880 | .64773 | .045 | .172 | -.383 | .342 | Yes |
| PS | 3.2140 | .57921 | -.218 | .172 | -.422 | .342 | Yes |
| DTA | 3.2140 | .57782 | .089 | .172 | .346 | .342 | Yes |

The results of the normality analysis for the study variables are shown in Table 2. The findings indicate that all variables achieved mean values ranging from 3.1880 to 3.2380, suggesting a moderate level of agreement among respondents. The standard deviation values, ranging between 0.57183 and 0.64773, demonstrate an acceptable spread of responses and indicate that the data are relatively consistent.

The assessment of normality was evaluated using skewness and kurtosis values. The skewness values for all variables ranged from -0.218 to 0.174, while the kurtosis values ranged from -0.422 to 0.346. These values fall within the acceptable threshold of ±1.0, indicating that the data are approximately normally distributed. In addition, the standard error (S.E.) values for skewness and kurtosis were consistent across variables at 0.172 and 0.342, respectively.

**Reliability Test**

Reliability refers to the degree to which repeated measurements of the same construct, using consistent procedures, produce stable and consistent results over time. In this study, reliability analysis was performed, and the results are presented in Table 3. These findings provide evidence regarding the consistency and dependability

of the measurement scales employed in this research.

Table 3: Reliability Test Results

| Construct | Items | Cronbach's Alpha value | Internal consistency status |
|---|---|---|---|
| IQ | 5 | .908 | Good reliability |
| SysQ | 5 | .915 | Good reliability |
| SQ | 5 | .899 | Good reliability |
| PS | 5 | .892 | Good reliability |
| DTA | 5 | .895 | Good reliability |

The results of the reliability analysis indicated a high level of reliability for the constructs under examination. The IQ, which consists of five items, has a Cronbach's alpha of 0.908, thereby providing evidence of its reliability. Similarly, the construct of SysQ, which comprises five items, has the highest value of Cronbach's alpha of 0.915, indicative of excellent reliability. The construct of SQ, comprising five items, instrument demonstrated good internal consistency, as indicated by a Cronbach's alpha coefficient of 0.899. The PS and DTA, which also comprises five items, show the value of Cronbach's alpha of 0.892 and 0.895 respectively, thereby providing evidence of its reliability.

**Validity Test**

The adequacy of the sample data was assessed using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity. Bartlett's test evaluates the null hypothesis that the variables are uncorrelated in the population correlation matrix. A KMO value exceeding 0.60, together with a Bartlett's test significance level below 0.05, indicates that the data are suitable for factor analysis and that meaningful relationships exist among the variables (Hair et al., 2024).

As reported in Table 4, the KMO values for the constructs are high scale as follows: IQ and SQ have same value of KMO (0.875), SysQ (0.877), and PS (0.873), indicating strong sampling adequacy. Then, DTA also showed KMO value of 0.846. Additionally, the significance values for Bartlett's test are all below 0.001, confirming that the correlation matrix is not an identity matrix and that the data are appropriate for component or factor analysis. These results demonstrate that the dataset meets the necessary assumptions for proceeding with further validity and dimensionality assessments.

Table 4: Results of the KMO and Bartlett Test

| Construct | KMO | Sampling adequacy | Bartlett test | Factor analysis suitability |
|---|---|---|---|---|
| IQ | .875 | Acceptable | <0.001 | Acceptable |
| SysQ | .877 | Acceptable | <0.001 | Acceptable |
| SQ | .875 | Acceptable | <0.001 | Acceptable |
| PS | .873 | Acceptable | <0.001 | Acceptable |
| DTA | .846 | Acceptable | <0.001 | Acceptable |

Convergent validity pertains to the correlation among individual measurement items when a measurement instrument assesses a concept. Adequate convergent validity is achieved when the average variance extracted (AVE) is more than 0.5 and the composite reliability (CR) is higher than 0.7 (Fornell & Larcker, 1981; Hair et al., 1998). The results are in Table 5.

Table 5: Results of Indicators Related to Convergent Validity

| Construct | Items | SFL | TVE | CR | AVE>0.5 |
|---|---|---|---|---|---|
| Information Quality (IQ) | IQ1 | .831 | 73.122% | .911 | .731 |
| | IQ2 | .862 | | | |
| | IQ3 | .889 | | | |

| | | | | | |
|---|---|---|---|---|---|
| | IQ4 | .851 | | | |
| | IQ5 | .842 | | | |
| System Quality (SysQ) | SysQ1 | .861 | 74.585% | .917 | .746 |
| | SysQ2 | .876 | | | |
| | SysQ3 | .865 | | | |
| | SysQ4 | .863 | | | |
| | SysQ5 | .853 | | | |
| Service Quality (SQ) | SQ1 | .847 | 71.282% | .905 | .712 |
| | SQ2 | .859 | | | |
| | SQ3 | .834 | | | |
| | SQ4 | .843 | | | |
| | SQ5 | .839 | | | |
| Perceived Security (PS) | PS1 | .830 | 69.762% | .898 | .697 |
| | PS2 | .856 | | | |
| | PS3 | .829 | | | |
| | PS4 | .814 | | | |
| | PS5 | .847 | | | |
| Digital Technology Acceptance (DTA) | DTA1 | .818 | 70.464% | .896 | .705 |
| | DTA2 | .860 | | | |
| | DTA3 | .858 | | | |
| | DTA4 | .845 | | | |
| | DTA5 | .816 | | | |

The first independent variable is information quality (IQ) shows that standardized factor loading (SFL) of all items above 0.7, CR is 0.911, and AVE is 0.731. The results indicate that the PU scale has good convergent validity. The second independent variable is the system quality (SysQ). SFL of all items above 0.7, CR is 0.917, and AVE is 0.746. The results indicate that the SysQ scale has good convergent validity. The third independent variable is service quality (SQ) has SFL of all items above 0.7, CR is 0.905, and AVE is 0.712. The fourth is perceived security (PS) as moderator variable shows SFL of all items above 0.7, CR is 0.898, and AVE is 0.697. Then, the DTA has an SFL greater than 0.7 for all items, the values of CR and AVE are 0.896, and 0.705 respectively. The DTA construct also satisfied the required validity criteria, indicating that the observed indicators adequately represent the underlying structure of the data.

Furthermore, discriminant validity is essential to ensure that each construct is empirically distinct from others within the model. Based on the Fornell–Larcker criterion, the square root of the AVE for each construct was compared with the correlations between constructs, exceeded its corresponding inter-construct correlations, suggesting that each construct shares more variance with its own indicators than with other constructs. This provides evidence of satisfactory discriminant validity at the construct level (Fornell & Larcker, 1981; Hair et al., 2024). Table 6 indicates that the discriminant validity between the constructs has been successfully tested and confirmed.

Table 6: Discriminant Validity Test

| | DTA | IQ | PS | SQ | SysQ |
|---|---|---|---|---|---|
| DTA | .839 | | | | |
| IQ | .635 | .855 | | | |
| PS | .729 | .463 | .835 | | |
| SQ | .410 | .265 | .433 | .844 | |
| SysQ | .731 | .420 | .513 | .273 | .864 |

Specifically, the results indicate that all constructs satisfied the Fornell–Larcker criterion. The diagonal values for DTA=0.839, IQ=0.855, PS=0.835, SQ=0.844, and SysQ=0.864 were higher than their respective inter-construct correlation values. For instance, the square root of AVE for DTA (0.839) exceeded its correlations with IQ (0.635), PS (0.729), SQ (0.410), and SysQ (0.731). Similarly, the square root of AVE for SysQ (0.864) was greater than its correlations with other constructs, ranging from 0.273 to 0.731. These findings demonstrate that each construct is empirically distinct and measures different concepts within the proposed research model. Therefore, the measurement model achieved satisfactory discriminant validity, confirming that the constructs do not overlap excessively and are suitable for further structural model analysis.

**Hypothesis Testing**

**Direct Effect**

Table 7 show the result of the coefficient of determination ($R^2$) for DTA is 0.684, indicating that 68.4% of the variance in DTA is explained by the independent variables included in the model. The adjusted $R^2$ value of 0.679 further confirms the strong explanatory power and predictive capability of the model after accounting for the number of predictors.

Table 7: Model Fit of the Study

| Model Selection Criteria | DV | R | $R^2$ | $R^2$ Adjusted | Std. | Model fit ($R^2$>0.5) |
|---|---|---|---|---|---|---|
| 1 | DTA | .827 | .684 | .679 | .327 | Good fit |

Table 8 presents the results of hypothesis testing for the direct relationships and moderating effect in the structural model. According to established guidelines, a hypothesis is considered supported when the p-value is less than 0.05 and the t-value exceeds 1.96 for a two-tailed test at the 5% significance level (Hair et al., 2022; Sarstedt et al., 2017).

Table 8: Results of Hypothesis Testing

| Hypothesis | Path | Path Coefficients | S. D | T-value | P-value | Results |
|---|---|---|---|---|---|---|
| H1 | IQ → DTA | .283 | .048 | 5.845 | .000 | **Supported** |
| H2 | SysQ → DTA | .403 | .045 | 8.995 | .000 | **Supported** |
| H3 | SQ → DTA | .077 | .036 | 2.159 | .031 | **Supported** |
| H4 | PS x IQ → DTA | .037 | .038 | .978 | .328 | Not supported |
| | PS x SysQ → DTA | -.132 | .049 | 2.704 | .007 | **Supported** |
| | PS x SQ → DTA | .126 | .033 | 3.817 | .000 | **Supported** |

The results show that IQ has a significant positive relationship with DTA ($\beta = 0.283$, $t = 5.845$, $p < 0.001$). Therefore, H1 is supported. This indicates that higher quality information, such as accurate, timely, and relevant digital information, contributes positively to the acceptance of digital technology among users. SysQ demonstrates a significant positive effect on DTA ($\beta = 0.403$, $t = 8.995$, $p < 0.001$), supporting H2. Among all direct relationships, SysQ records the highest path coefficient and t-value, indicating that system-related characteristics such as reliability, usability, accessibility, and efficiency play the strongest role in influencing users' acceptance of digital technology. SQ also shows a positive and significant relationship with DTA ($\beta = 0.077$, $t = 2.159$, $p = 0.031$), thus supporting H3. Although the effect size is relatively smaller compared to IQ and SysQ, the significant result indicates that support services, responsiveness, and assistance provided to users remain important factors in enhancing technology acceptance.

For the moderating effects of PS x IQ→DTA is not significant ($\beta = 0.037$, $t = 0.978$, $p = 0.328$). Therefore, H4 is not supported. This result suggests that PS does not strengthen the relationship between IQ and DTA. However, the interaction of PS x SysQ→DTA is significant but negative ($\beta = -0.132$, $t = 2.704$, $p = 0.007$). This finding indicates that PS negatively moderates the relationship between SysQ and DTA. The negative coefficient suggests that when PS increases, the positive influence of SysQ on DTA becomes weaker. Despite this weakening effect, the moderation relationship remains statistically significant. In contrast, the interaction of PS x SQ→DTA is positive and significant ($\beta = 0.126$, $t = 3.817$, $p < 0.001$). This result indicates that PS strengthens the

relationship between SQ and DTA. Users who perceive higher levels of security are more likely to value quality services, which subsequently enhances their acceptance of digital technology.

## DISCUSSION

This study examined the determinants of digital technology acceptance (DTA) among micro, small, and medium enterprises (MSMEs) in northern Malaysia by integrating the Information System Success Model (ISSM) together with the moderating role of perceived security (PS). The findings confirm that quality-related dimensions remain critical drivers of technology adoption among MSMEs, while perceived security exerts a complex influence on the relationships between system characteristics and adoption behaviour. The study extends the applicability of ISSM within the MSME digital transformation context by demonstrating that technology acceptance is influenced not only by system performance and information effectiveness, but also by users' perceptions of digital security.

The significant influence of information quality on DTA suggests that MSMEs place considerable importance on the usefulness and reliability of information generated by digital systems. From a theoretical perspective, this finding reinforces the ISSM argument that high-quality information enhances users' confidence and decision-making capabilities, thereby encouraging technology adoption. MSMEs often operate with limited resources and require accurate, timely, and understandable information to support operational efficiency and business sustainability. In the context of digital transformation, reliable information reduces uncertainty and improves managerial responsiveness, which is especially important for small businesses operating in competitive environments. This finding supports previous studies indicating that information quality enhances technology acceptance and organizational performance because users perceive greater value in systems capable of providing relevant business insights (Almaiah et al., 2022).

Among all predictors, system quality emerged as the most influential factor affecting DTA. This finding highlights the practical reality that MSMEs prioritize systems that are easy to use, reliable, accessible, and efficient. The result further supports the ISSM proposition that technical performance strongly shapes users' behavioural intentions and satisfaction. In the MSME context, system simplicity and functionality are particularly important because many business owners possess limited technological expertise and lack dedicated IT support. Therefore, systems perceived as complicated or technically unstable may discourage adoption despite offering useful features. The strong influence of system quality also reflects the importance of user-centred digital platforms in supporting MSMEs' digital transformation efforts. This finding aligns with prior literature emphasizing that user-friendly systems reduce operational burden and improve technology acceptance among small business operators (DeLone & McLean, 2003; Almaiah et al., 2022).

Although service quality demonstrated a weaker effect compared to information quality and system quality, the findings indicate that support services remain essential in encouraging digital technology adoption. Theoretically, this suggests that technology acceptance among MSMEs is not solely dependent on the technological system itself, but also on the surrounding support ecosystem. MSMEs often require technical guidance, customer support, and responsive assistance during the implementation process due to limited digital knowledge and experience. Effective service support can reduce resistance to change, strengthen users' confidence, and facilitate continuous system usage. The finding therefore highlights the importance of digital service providers and policymakers in offering ongoing training, technical assistance, and after-sales support to improve digital readiness among MSMEs.

The moderating role of perceived security produced mixed findings, indicating that security perceptions influence technology acceptance in different ways depending on the system dimension involved. The non-significant moderating effect between perceived security and information quality suggests that MSMEs may evaluate information usefulness independently from security concerns. In other words, users continue to value accurate and relevant information regardless of their level of security perception. This may imply that functional business benefits remain the primary consideration for MSMEs when assessing information quality. Such findings support previous research suggesting that practical usefulness often outweighs security considerations during the early stages of technology adoption (Choung et al., 2023).

Interestingly, perceived security negatively moderated the relationship between system quality and DTA. This finding provides an important theoretical insight into the trade-off between security and usability in digital systems. While security mechanisms are designed to protect users and enhance trust, excessive security requirements may unintentionally increase system complexity and reduce convenience for MSMEs. Features such as multi-factor authentication, verification procedures, and access restrictions may create additional operational difficulties for users with limited digital capabilities. Consequently, systems perceived as highly secure may also be perceived as less flexible or less user-friendly. This finding suggests that MSMEs prefer digital systems that balance adequate protection with operational simplicity. It also reflects the broader usability-security paradox discussed in digital technology literature, where stronger security measures may reduce users' willingness to adopt systems if they interfere with efficiency and ease of use (AlNuaimi et al., 2024).

Conversely, perceived security positively strengthened the relationship between service quality and DTA. This finding indicates that security perceptions enhance the value users place on support services provided by digital platforms. When MSMEs perceive digital environments as secure, they are more likely to trust customer support services, technical guidance, and digital interactions. This reinforces the importance of trust-building mechanisms in digital transformation initiatives. Secure environments encourage MSMEs to engage more confidently with digital service providers, thereby improving technology acceptance behaviour. In the Malaysian MSME context, where cybersecurity awareness is becoming increasingly important, the integration of reliable support services with strong security assurance can significantly improve digital adoption outcomes.

Overall, this study contributes theoretically by extending ISSM through the inclusion of perceived security as a moderating variable within the MSME context. The findings demonstrate that quality dimensions remain central to digital technology acceptance, while perceived security introduces both enabling and constraining effects depending on the technological dimension involved. Practically, the study suggests that policymakers and digital platform providers should focus not only on improving system functionality and information reliability, but also on designing security mechanisms that do not compromise usability. Enhancing cybersecurity awareness, providing user-friendly digital platforms, and strengthening technical support services are essential strategies for accelerating digital transformation among MSMEs in northern Malaysia.

## CONCLUSION

This study applied ISSM to explore the internal determinants of DTA. The analysis revealed that the p-value for IQ is less than 0.001, indicating a significant positive relationship between consumer IQ and DTA, thus supporting H1. Similarly, the p-value for SysQ is less than 0.001, showing a strong positive correlation between SysQ and DTA, supporting H2. The p-value for SQ is also less than 0.001, showing a positive correlation between SQ and DTA, supporting H3. However, the p-value for PS moderates IQ on DTA is 0.328, which exceeds the significance level of 0.05, leading to the rejection of H4a. Additionally, PS was shown to significantly moderate the relationship between SysQ and SQ toward DTA, supporting H4b and H4c respectively.

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