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RESEARCH ARTICLE

Adoption of Mobile Business Applications by MSMES: Integrating Application Quality, Toe Model and Diffusion of Innovation

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ABSTRACT

This study uses the technology, organization, and environment (TOE) framework and the diffusion of innovation (DOI) theory to measure the intention of MSME owners to use this application and to understand the factors that influence their adoption. The study uses a quantitative approach with a sample consisting of 400 MSME respondents in Indonesia, data collection using Google Forms, analyzed using a structural equation model - partial least square (SEM PLS). The results of the study state that MSMEs can increase adoption by ensuring that their organizational structure and environment are conducive to technology use, providing training and development for employees, and collaborating with external technology providers. Future research can analyze specific types of mobile business applications and differentiate respondents based on their application usage experience. Third, longitudinal analysis is needed because mobile business applications are growing rapidly over time.

INTRODUCTION

In the last ten years, various countries have demonstrated remarkable technological advancements. The use of smartphones has become essential due to their significant impact on social and economic aspects (Madan & Yadav, 2016). This is also true in Indonesia, with mobile phone users making up 62.84% of the total population and increasing by an average of 2.48% per year (BPS-Statistics Indonesia, 2021). Based on the devices used, 98.31% of the population accesses the internet using mobile phones (BPS-Statistics Indonesia, 2021). The large number of internet users in Indonesia creates business opportunities for companies to develop their businesses by leveraging technology (Akturan & Tezcan, 2012). The popularity of the internet and the rapid penetration of business in developing countries have created significant opportunities and challenges for business actors (Duncombe & Boateng, 2009). These opportunities can also be utilized by MSMEs, as 22.35% of Indonesia's population uses the internet to purchase goods/services (BPS-Statistics Indonesia, 2021). However, it is not easy for MSMEs to enter the digitalization era. There are 64.1 million SMEs in Indonesia, but only 12.82 million MSMEs (20%) are digitally literate (UMKM, 2018). This means

that most MSMEs still face obstacles in digitalization, such as a lack of competence and low MSME characteristics (Hardiyanto et al., 2022).

Technology-based companies in Indonesia are actively developing mobile business applications (Hardiyanto et al., 2022). To help MSMEs enter the digital era, there are many applications that can be used in managing MSMEs. These applications can help all business owners manage their businesses more easily. Previous studies have shown the benefits of mobile applications for business in various contexts such as tourism (Zhang et al., 2019), banking (Rafdinal & Senalasari, 2021), and e-business (Abdullah et al., 2018). However, how the adoption of business applications for MSMEs has not been fully explored, with previous study suggesting further exploration (Hardiyanto et al., 2022). Therefore, to gain the benefits of mobile business applications, this study will analyze the adoption of mobile business applications for MSMEs in Indonesia. Practically, this study will help application providers in evaluating applications that meet the expectations of business managers or owners. Theoretically, this study will complement previous literature on the adoption of mobile business applications, particularly for MSMEs.

To address this objective, this study proposes a framework to explore the adoption of mobile business applications by integrating the Technology, Organization, and Environment (TOE) framework (Tornatzky & Fleischer, 1990) with the Diffusion of Innovation (DOI) theory (Rogers, 1995). Specifically, this framework comprises factors related to the external environment, organizational capabilities, and innovation attributes. Previous studies have also validated the TOE model in various technology adoptions, such as social media (Chinyuku et al., 2022; Eze et al., 2021a) and intelligent agent technology in food supply chain management (Mukherjee & Chittipaka, 2022). In general technology adoption, the Diffusion of Innovation (DOI) (Rogers, 1995) is crucial for understanding how new technologies are adopted and disseminated in society. DOI has been applied in contexts related to technology, such as mobile applications (Mas'ud et al., 2022; Menzli et al., 2022). To gain deeper insights into mobile business applications, this study analyzes application quality as a technological aspect within the TOE framework, consisting of system quality, information quality, and service quality (DeLone & McLean, 2003). These three dimensions of application quality have been proven in previous studies to measure application quality in mobile payment applications (Mouakket, 2020), VR applications (Rafdinal et al., 2024), and mobile banking (Mansour, 2020). Integrating TOE, DOI, and application quality into a single comprehensive model for the adoption of business applications has not been previously conducted. By using this integrated model, this study will contribute to broader scientific knowledge on the adoption of mobile business applications by MSMEs. It also provides support for decision-making and resource allocation by companies regarding the adoption of mobile business applications by MSMEs. Therefore, it is important to evaluate the adoption of mobile business applications by MSMEs both theoretically and practically.

LITERATURE REVIEW

Adoption of Business Applications in MSMEs

The adoption of technology in MSMEs is important for enhancing competitiveness and sustainability. Various studies have explored the factors influencing technology adoption in MSMEs in various contexts. The TOE framework is used to identify important factors driving the adoption of social media marketing technology (SMMT) by MSMEs in Nigeria (Eze et al., 2021a), emphasizing the importance of organizational and environmental factors in technology adoption decisions. In addition, owner innovation, IT capabilities, and experience are important factors influencing the sustainability of e-commerce in Thailand MSMEs, emphasizing the role of human resources and technological skills in driving technology adoption in MSMEs (Amornkitvikai et al., 2022). The high level of technology acceptance among MSMEs indicates a positive attitude towards its implementation (Gupta et al., 2022). Furthermore, the use of social media can improve performance (Chinyuku et al., 2022; Eze et al., 2021a). These studies highlight the diverse technology adoption in

MSMEs, emphasizing the importance of organizational, environmental, and individual factors in shaping adoption decisions, especially for MSMEs.

In mobile applications for MSMEs, several studies provide insights into the factors influencing the adoption of digital technology in the context of MSMEs. Previous studies have discussed how the adoption of digital financial services, such as mobile money, can enhance financial inclusion among MSMEs (Okello Candiya Bongomin et al., 2021). These findings indicate that trust and accessibility to financial services are key factors in technology adoption among MSMEs. Additionally, another study highlights the positive impact of digital marketing and e-commerce adoption on the performance and competitiveness of MSMEs (Ariska et al., 2022). Furthermore, in the context of mobile business applications for MSMEs, the focus is on the factors of usefulness and ease of use in the technology acceptance model, and facilitating conditions in the adoption of mobile business applications (Hardiyanto et al., 2022). These studies emphasize the importance of internal and external factors, including organizational strategies and market orientation, in influencing the outcomes of technology adoption, specifically in the context of mobile business applications for MSMEs. This study will explain the adoption of mobile business applications by MSMEs based on internal and external environmental factors within the integrated TOE and DOI framework.

TOE and DOI

The TOE theory (Tornatzky & Fleischer, 1990) has been extensively applied to research on technology adoption in MSMEs. This framework has been utilized to explore various aspects of technology adoption, such as mobile e-grocery applications in SMEs (Mkansi & Nsakanda, 2023) and social media adoption among SMEs in Zimbabwe (Chinyuku et al., 2022). Additionally, research has used the TOE framework to identify success determinants influencing the adoption of social media marketing technology in SMEs in Nigeria (Eze et al., 2021a). The TOE theory's application extends beyond technology adoption to areas like environmentally friendly supply chain management (Lin et al., 2020), highlighting its effectiveness in understanding the interaction of technological, organizational, and environmental factors in adoption decisions. This study employs the TOE framework to explain the adoption of mobile business applications for MSMEs. Complementarily, the DOI theory (Rogers, 1995) explains how innovations spread and are accepted within society or organizations (Berwick, 2003). Previous study indicates that technology adoption, including mobile applications, significantly impacts MSME performance, particularly regarding relative advantage, ease of use, compatibility, and observability (Mas'ud et al., 2022). The DOI theory has also been applied to educational resource adoption, showing that advantageous, compatible, less complex, and observable technologies influence adoption (Menzli et al., 2022). Its versatility is demonstrated through applications in the health sector and educational environments (Menzli et al., 2022; Pagoto et al., 2008), making it a robust framework for examining mobile business application adoption in MSMEs. This study integrates the TOE and DOI theories to provide a comprehensive understanding of mobile business application adoption in MSMEs, as illustrated in Figure 1.

Hypotheses Development

TOE and Adoption Intention

The influence of application quality (system quality, information quality, and service quality) on adoption intention has been proven in previous studies (Awad et al., 2022; Mansour, 2020; Mouakket, 2020; Rafdinal et al., 2024). In the context of e-learning, it is shown that system quality, information quality, and service quality dimensions positively influence adoption intention and the net benefit of e-learning (Awad et al., 2022). Additionally, in virtual reality applications, it is shown that application quality influences value, which ultimately affects adoption intention (Rafdinal et al., 2024). In the context of mobile payment, application quality determined by system quality, information quality, and service quality dimensions affects user expectations and satisfaction, which

in turn influences continuance intention usage (Mouakket, 2020). Other studies also use the same dimensions to measure mobile banking applications, proving their influence on adoption intention and actual usage (Mansour, 2020). The results of these studies provide a basis for formulating hypotheses about the relationship between application quality dimensions and adoption intention.

H1a. Application quality has a positive and significant influence on adoption intention.

H1b. (1) System quality, (2) information quality, and (3) service quality have a positive and significant influence on adoption intention

The organization in the TOE framework by Tornatzky and Fleischer (1990) is defined as the internal characteristics of an organization that influence its ability to adopt and implement new technologies. The organization, which is one of the constructs in TOE, has been proven to influence adoption intention in previous studies (Chinyuku et al., 2022; Eze et al., 2021a; Mukherjee & Chittipaka, 2022). The dimensions of the organization include relative advantage, complexity, cost, innovation adoption, top management support, and environmental uncertainty, among others, which influence the adoption process of various technologies (Mukherjee & Chittipaka, 2022). A study on social media marketing shows that organizational support in the context of MSMEs influences the adoption of social media marketing technology (Eze et al., 2021b). Furthermore, in social media adoption, organizational support factors focusing on top management influence social media adoption in MSMEs (Chinyuku et al., 2022).

H2a. Organization has a positive and significant influence on adoption intention.

H2b. (1) Managerial capability, (2) managerial support, and (3) technical capability have a positive and significant influence on adoption intention.

The TOE framework, in the context of the environment, refers to external factors that influence an organization's adoption and implementation of new technologies (Tornatzky & Fleischer, 1990). Previous studies have proven the influence of environmental factors in the adoption of various technologies such as social media marketing technology (Chinyuku et al., 2022; Eze et al., 2021b) and food supply chain management technology (Mukherjee & Chittipaka, 2022). Environmental factors include external pressures, competitive dynamics, regulatory requirements, and market conditions that can either facilitate or hinder the adoption of innovations (Awuah et al., 2022). Factors such as competitive pressures, market demands, and regulatory landscapes all play a role in shaping organizations' adoption intentions (Jo & Bang, 2023). The majority of these studies highlight the importance of government support, competitive pressure, environment, technology provider, and customer factors in influencing adoption. Therefore, the hypotheses for this influence are:

H3a. The environment has a positive and significant influence on adoption intention.

H3b. (1) Government involvement, market (2) uncertainty, (3) competitive pressure, and (4) vendor partnership have a positive and significant influence on adoption intention.

Diffusion of Innovation and Adoption Intention

Diffusion of Innovations is the process through which an innovation is communicated through specific channels over time among the members of a social system (Rogers, 1995). Perceptions of an innovation's attributes are crucial predictors of adoption intention, as indicated by the diffusion of innovations conceptual framework. Innovation characteristics in the diffusion of innovations, such as relative advantage and compatibility, significantly influence adoption (Awad et al., 2022; Mohanty et al., 2022). Other studies explain the three main dimensions in this framework, namely relative advantages, complexity, and compatibility, showing their influence on adoption intention (Mas'ud et al., 2022; Menzli et al., 2022). The DOI theory views adoption as a social construct influenced by individuals' willingness to adopt technology. In this study, which focuses on mobile business

applications, we hypothesize that diffusion of innovation and its dimensions influence adoption intention.

H4a. Diffusion of innovation positively and significantly influences adoption intention.

H4b. (1) Compatibility, (2) relative advantage, and (3) complexity positively and significantly influence adoption intention.

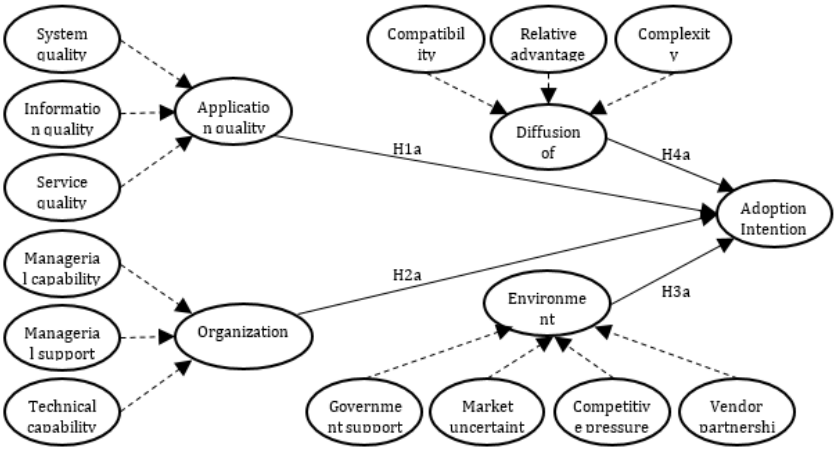

Figure 1: Research model for constructs level

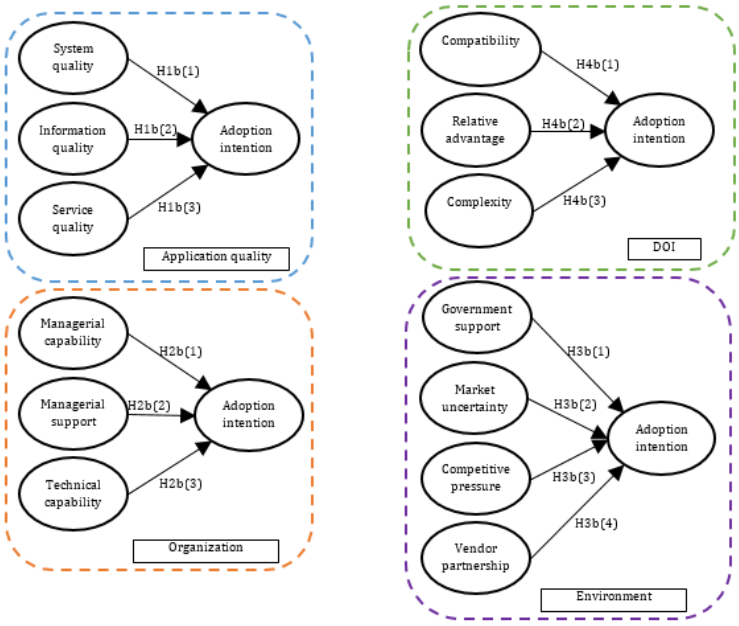

Figure 2: Research model for dimensions' level

METHODOLOGY

Sampling and Data Collection

This study utilized purposive sampling as the data collection technique. Purposive sampling, a non-probability sampling method, was selected because it enables the selection of samples based on specific characteristics and perspectives relevant to mobile business applications. The selection

criteria included: (1) respondents being business owners or managers who regularly use mobile business applications; and (2) respondents who have used such applications at least once in the past month. To obtain the appropriate sample, we surveyed members of online communities dedicated to mobile business applications. The survey began with an initial question regarding their experience with these applications. Individuals who had never used mobile business applications were excluded from the survey. Data were collected through online surveys using Google Forms and distributed to mobile business app users across various regions in Indonesia via several online communities on platforms such as LinkedIn, Facebook, and Instagram. The data collection occurred over three weeks in April 2024. Out of 420 responses received, 397 were considered suitable for further analysis (see Table A1). The sample size was determined using G*Power, based on statistical power analysis. The study sample achieved a statistical power value of 0.95, exceeding the threshold value of 0.8 (Carranza et al., 2020; Hair et al., 2022), indicating that the sample size meets acceptable criteria.

Measurement

Items for the research constructs in this study were modified and adapted from previous studies. TOE was measured with eight variables adopted from several previous studies. In the technology factor, the variables used are application quality consisting of system quality, information quality, and service quality (Mansour, 2020; Mouakket, 2020). The organization factor consists of three variables: managerial capability, managerial support, and technical capability. Finally, the environment factor is measured with government involvement, market uncertainty, competitive pressure, and vendor partnership (Chen et al., 2021; Chinyuku et al., 2022; Eze et al., 2021a). Then, DOI is measured with four variables adopted from previous studies, consisting of compatibility, relative advantage, and complexity (Chen et al., 2021; Mas'ud et al., 2022; Menzli et al., 2022). A seven-point Likert scale is used for all items from 1 (strongly disagree) to 7 (strongly agree). This study took two steps to ensure the validity and reliability of the questionnaire. In the first step, three academics outside of this study were invited to comment on the questionnaire's content to ensure the words and content of the questionnaire are correct and free from ambiguity issues. This step was carried out by several representatives of MSMEs and application development companies such as Gobiz by Gojek. The second step is a pre-test that distributed the questionnaire to a minimum of 30 respondents to ensure the questionnaire is valid and reliable.

Data Analysis

In analyzing the questionnaire results, this study will utilize the Structural Equation Modeling-Partial Least Squares (SEM-PLS) approach. This method allows for the examination of the relationships among variables, specifically focusing on application quality, TOE, and DOI. Unlike traditional statistical methods, SEM-PLS is particularly adept at exploring and developing theories rather than simply confirming existing ones. It is well-suited for complex research models that consist of multiple constructs and indicators (Hair et al., 2022). The data analysis will follow a two-step approach: the initial stage will assess the measurement model's validity and reliability, ensuring that the selected variables effectively measure the intended constructs. The subsequent stage will analyze the relationships between constructs in the structural model, providing insights into how these variables interact and influence one another (Hair et al., 2022). This comprehensive analytical framework will enable a thorough understanding of the factors influencing the adoption of mobile business applications.

DISCUSSION

Measurement model

The evaluation model assesses the constructs used in this study on mobile business applications for both validity and reliability, including convergent and discriminant validity (Hair et al., 2022). Convergent validity is confirmed by outer loadings exceeding 0.708 and Average Variance Extracted

(AVE) values above 0.50, indicating that the constructs accurately reflect the relevant indicators and explain at least 50% of their variance. Construct reliability, measured using Composite Reliability (CR) and Cronbach's alpha, is demonstrated by CR values above 0.865 and alpha values exceeding 0.773 (see Table A2). Discriminant validity, assessed using the heterotrait-monotrait (HTMT) ratio, requires HTMT values below 0.90, indicating that constructs represent distinct functionalities (see Table A3). In this study, all constructs and indicators are validated and reliable, with HTMT results confirming satisfactory discriminant validity (Hair et al., 2022).

Application quality, organization, environment, and diffusion of innovation are second-order formative constructs. Therefore, measurement is required according to formative criteria. We evaluated content validity both individually and at the construct level. VIF values for all constructs are 1.203 and 3.906 (see Table A4). Although one VIF is slightly above 3.00, it is well below the acceptable limit of 5 (Hair et al., 2022), indicating no multicollinearity issues among the dimensions. Further analysis assessed the importance and relevance of these dimensions. Each dimension surpassed the critical T-value of 1.96 and showed significance levels below 0.05. The results verify that these dimensions are the dimensions of their respective constructs.

Structure model

Before analyzing structural relationships in mobile business applications constructs, it is essential to evaluate collinearity to ensure unbiased regression results by using the Variance Inflation Factor (VIF). The VIF should be less than 3 (Hair et al., 2022). In this study, the VIF values ranged from 1.240 to 3.591, indicating no collinearity issues (See Table 1). Furthermore, the evaluation criteria for the structural model include the coefficient of determination (R^2), effect size (f^2), cross-validated redundancy (Q^2), and path coefficient (Hair et al., 2022). The R^2 value showed that adoption intention was influenced by application quality, organization, environment, and diffusion of innovation by 69.1%. For Q^2 evaluation, a Q^2 value greater than zero indicates the exogenous construct's predictive relevance to the endogenous construct (Hair et al., 2022). Q^2 value obtained is 0.660, indicating good predictive power. The effect size (f^2) helps determine the strength of an independent construct's influence on a dependent construct. Categories for f^2 are small (0.02–0.15), medium (0.15–0.35), and large (>0.35) (Hair et al., 2022). Results indicated large effect sizes for the environment on adoption intention (0.350). Other influences fell into the small effect size category.

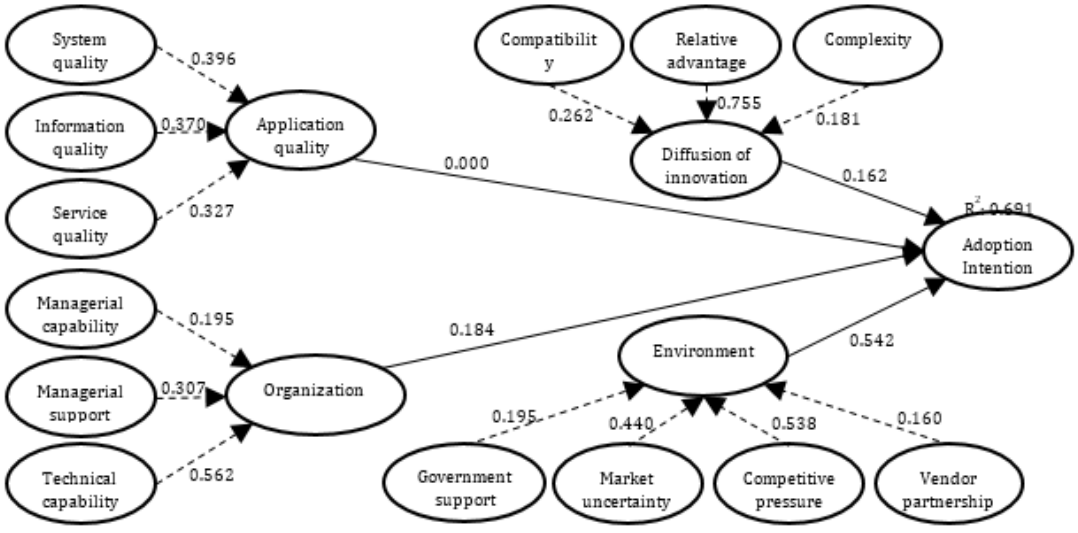

Figure 3: Result model for all constructs

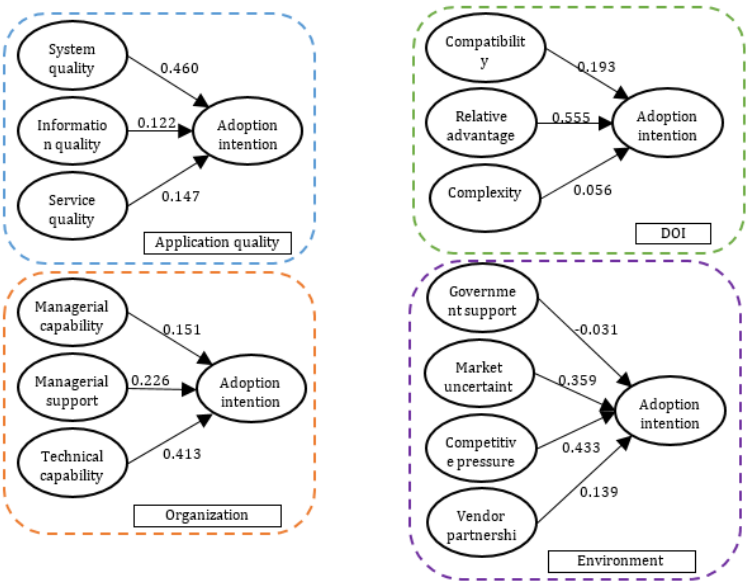

Figure 4: Result model for all dimension

Table 1: Hypotheses results

Hypotheses	β	T - Values	VIF	P - Values	Supported
H1a. Applications quality -> Adoption Intention	0.000	0.005	3.455	0.996	No
H1b(1). System quality -> Adoption Intention	0.460	5.009	3.416	0.000	Yes
H1b(2). Information quality -> Adoption Intention	0.122	1.221	4.174	0.222	No
H1b(3). Service quality -> Adoption Intention	0.147	2.443	2.234	0.015	Yes
H2a. Organization -> Adoption Intention	0.184	2.318	3.591	0.020	Yes
H2b(1) Managerial capability -> Adoption Intention	0.151	2.245	3.216	0.025	Yes
H2b(2) Managerial support -> Adoption Intention	0.226	3.103	3.912	0.002	Yes
H2b(3) Technical capability -> Adoption Intention	0.413	5.510	3.690	0.000	Yes
H3a. Environment -> Adoption Intention	0.542	8.896	2.781	0.000	Yes
H3b(1) Government support -> Adoption Intention	-0.031	0.630	1.852	0.529	No
H3b(2) Market uncertainty -> Adoption Intention	0.359	6.371	2.424	0.000	Yes
H3b(3) Competitive pressure -> Adoption Intention	0.433	7.481	2.402	0.000	Yes
H3b(4) Vendor partnership -> Adoption Intention	0.139	2.614	1.861	0.009	Yes
H4a. Diffusion of innovation -> Adoption Intention	0.162	2.309	3.156	0.021	Yes
H4b(1) Compatibility -> Adoption Intention	0.193	2.858	2.478	0.004	Yes
H4b(2) Relative advantages -> Adoption Intention	0.555	9.336	2.655	0.000	Yes
H4b(3) Complexity -> Adoption Intention	0.056	1.519	1.240	0.129	No

Source: processed by author, 2024

Next, analyze path coefficients using bootstrapping with 95% confidence intervals, employing 10,000 subsamples to ensure that t-values exceed 1.96 (Hair et al., 2022). The test results show that application quality does not significantly affect adoption intention (β=0.000), rejecting H1a. In the dimension of application quality, system quality (β=0.460) and service quality (β=0.147) have a significant impact on intention, supporting H1b (1) and H1b (3). However, information quality does not significantly affect adoption intention (β=0.122), rejecting H1b (2). Furthermore, the construct

organization has a positive and significant impact on adoption intention (β=0.184), supporting H2a. Similarly, all dimensions of organization, including managerial capability (β=0.151), managerial support (β=0.226), and technical capability (β=0.413), significantly influence adoption intention, supporting H2b (1), H2b (2), and H2b (3). The construct environment also shows a significant effect on adoption intention (β=0.542), supporting H3a. Among the four dimensions of environment, three dimensions significantly influenced adoption intention: market uncertainty (β=0.359), competitive pressure (β=0.433), and vendor partnership (β=0.139), but government support did not show a significant impact (β=-0.031). These results support H3b (2) – H3b (4) and reject H3b (1). Finally, the diffusion of innovation significantly affected adoption intention (β=0.162), supporting H4a. Two dimensions of diffusion of innovation significantly influenced adoption intention: compatibility (β=0.193) and relative advantage (β=0.555), but complexity did not have a significant effect (β=0.056). These results support H4b (1) and H4b (2) and reject H4b (3).

DISCUSSION

This study confirms that integrating applications quality, TOE, and DOI into one framework can predict the adoption of mobile business applications for MSMEs. This model strengthens previous literature on the use of mobile applications in MSMEs (Hardiyanto et al., 2022; Mkansi & Nsakanda, 2023). This integrated model enhances the practicality and explanatory power of the three previous models in the business environment. Measurements of content quality, system quality, and information quality as constructs of application quality are specifically designed to measure specific attributes of mobile applications (Mansour, 2020; Mouakket, 2020; Rafdinal et al., 2024), while TOE explains external factors, namely technology, organization, and environment (Chinyuku et al., 2022; Eze et al., 2021a), and DOI is used to assess how new technology is adopted and disseminated within society (Mas'ud et al., 2022; Menzli et al., 2022). This proven integrated model provides a deeper analysis of user intentions to adopt mobile business applications. This model contributes to a deeper understanding of the adoption of mobile business applications and addresses the lack of research on mobile applications for MSMEs. Therefore, this study contributes to filling the identified gap and proves the theoretical framework (applications quality, TOE, and DOI) for assessing technology adoption in the context of mobile business applications for MSMEs.

In addition to demonstrating the strength of the research model, this study explains the relationship between application quality, TOE, and DOI on adoption intention of mobile business applications. First, the hypothesis testing results show that application quality has a positive but not significant effect on adoption intention. Overall, application quality may not significantly affect adoption intention because this factor may be considered as an expected prerequisite or as normal by users. When application quality reaches an adequate level or meets minimal standards, user attention may shift to other factors that more influence their decision to adopt the application, which in this study are organizational support, environment (Chinyuku et al., 2022; Mukherjee & Chittipaka, 2022), and diffusion of innovation. Furthermore, mobile applications are currently widely used and have become a habit for modern society (Rafdinal & Senalasari, 2021). Therefore, regardless of whether the application quality is high or low, they will still adopt it. This also proves that managers and owners of SMEs are a type of technology user known as techno-ready users who are ready to adopt new technology (Wiese & Humbani, 2020). These results provide an understanding that user characteristics determine the adoption of technology, especially mobile business applications for SMEs.

Although overall application quality does not significantly affect the adoption intention of business mobile applications, two dimensions of application quality, namely system quality and service quality, significantly influence adoption intention. This highlights the importance of these two dimensions in the adoption intention of business mobile applications. System quality includes aspects such as usability, reliability, and performance efficiency, which are prerequisites for the application to operate

smoothly and meet user expectations (Al-Hattami, 2021; Wut & Lee, 2022). High-quality systems reduce the likelihood of errors and increase the chances of adoption by users. Service quality, on the other hand, encompasses factors such as responsiveness, assurance, and support provided by the service provider (Al-Hattami, 2021; Mansour, 2020). When users feel they receive timely assistance, reliable information, and overall good service, their trust and confidence in the application increase, leading to higher adoption intentions (Awad et al., 2022; Mansour, 2020; Mouakket, 2020). System quality and service quality are crucial in creating a positive user experience and driving adoption intention. Therefore, this study expands understanding of the relationship between application quality and adoption intention, with implications for practitioners and researchers who seek to increase adoption of mobile business applications by improving system quality and service quality.

Second, this study confirms that organizational and environmental factors in the TOE framework significantly influence adoption intention. Organizational dimensions (managerial capability, managerial support, and technical capability) and environmental dimensions (environment support, market uncertainty, competitive pressure, and vendor partnership) also show a significant impact on adoption intention. These results align with previous studies in social media (Chinyuku et al., 2022), food supply chain management technology (Mukherjee & Chittipaka, 2022), and social media marketing technology (Eze et al., 2021b). Organizations with structures that support innovation, such as dedicated units for managing information technology, are more likely to embrace innovations like mobile business applications (Wikhamn, 2019). Supportive external environments, such as high technology adoption in the market or regulations encouraging the use of specific technologies, also increase adoption intentions (Awuah et al., 2022; Jo & Bang, 2023), particularly for mobile business applications. Therefore, organizational and environmental factors play a crucial role in shaping the intention to adopt technological innovations like mobile business applications for MSMEs. Theoretically, these findings complement the existing literature on the application of the TOE framework, especially in mobile business applications for MSMEs. This study also identifies important TOE dimensions for the adoption of mobile business applications

This study confirms that DOI and two dimensions, namely compatibility and relative advantage, influence the adoption of mobile business applications by MSMEs. These findings align with previous studies in the contexts of e-business adoption (Mas'ud et al., 2022), application adoption in education (Awad et al., 2022; Menzli et al., 2022), and enterprise resource planning (Mohanty et al., 2022). DOI is a theory that explains how, why, and how quickly innovations or new ideas are accepted and spread within a group or society (Rogers, 1995). In the context of adoption intention of mobile business applications, DOI significantly influences because it applies the concept that the adoption of mobile business applications depends not only on the characteristics of the innovation itself but also on how individuals or organizations perceive the innovation. These results emphasize that adoption is influenced by factors such as compatibility and relative advantage. It can be stated that mobile business applications that are compatible and offer advantages may be more effective in increasing the adoption of mobile business applications. Theoretically, this study complements previous studies in explaining the important role of DOI in influencing the adoption of mobile business applications, especially for MSMEs. This study also demonstrates that the two main dimensions of DOI, compatibility, and relative advantage, are determinants of adoption intention for mobile business applications.

CONCLUSION AND RECOMMENDATION

This study demonstrates that combining application quality, the TOE, and the DOI theory provides a comprehensive model for predicting MSMEs' adoption of mobile business applications. This study suggests that developers should prioritize these aspects when creating applications to enhance adoption. Given that general application quality is not a critical factor, focus should instead be placed on organizational support, environmental factors, and technological innovation (Chen et al., 2021).

MSMEs can increase adoption by ensuring their organizational structures and environments are conducive to technology use, providing training and development for employees, and collaborating with external technology providers. For developers, it is crucial to design applications that meet the specific needs of MSMEs through thorough market research and direct collaboration with these enterprises. Additionally, the government can play a supportive role by implementing policies and programs that encourage technology adoption, offering fiscal incentives or subsidies to MSMEs, and developing robust IT infrastructure. The study also highlights the influence of the DOI theory on adoption, highlighting the importance of compatibility, relative advantage, and complexity. MSMEs should evaluate these factors to choose suitable applications, while developers should ensure their products align with MSMEs' needs and are easy to use. By addressing these elements, the adoption of mobile business applications by MSMEs can be significantly increased, leading to improved efficiency and productivity.

Although this study provides valuable insights, several limitations must be acknowledged. Application quality does not significantly influence adoption intention, indicating that many other predictors focusing on explaining technology quality need to be investigated for future research. Second, respondents' experiences vary in using mobile business applications and using different types of applications. Future research could analyze specific types of mobile business applications and differentiate respondents based on their application usage experiences. Third, longitudinal analysis is needed because mobile business applications develop rapidly over time. Future research could focus on longitudinal studies. to demonstrate how the acceptance of mobile business applications changes over time. Finally, this study focused on users in developing countries such as Indonesia, which showed varied results based on the level of technology adoption. Future research could be expanded to other countries with different levels of adoption readiness.

AUTHOR(S) CONTRIBUTIONS

AF conceived the idea, designed the project, and wrote the manuscript. YF conducted the literature review, analyzed data, and assisted in drafting the manuscript. WR performed statistical analysis and contributed to the interpretation of results. All authors read and approved the final manuscript.

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