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Investigating the impact of digital business ecosystem in enhancing Islamic mobile banking adoption through the TOE framework

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ABSTRACT

This research investigates how the dimensions of the Technology, Organization, and Environment (TOE) framework influence the digital business ecosystem (DBE) and, in turn, how this ecosystem impacts the adoption of Islamic Mobile Banking (IMB). It addresses a gap in existing literature by adopting a customer-centric perspective, highlighting how DBE affects IMB adoption, a departure from previous studies that primarily focused on internal organizational factors. To achieve its objectives, the study employs a quantitative approach using Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze data from 985 IMB users in Indonesia. The findings reveal that DBE significantly influences IMB adoption, particularly when moderated by customer behavior as an environmental factor. Factors such as perceived usefulness and ease of use within the technological domain, firm reputation and innovation within the organizational domain, and perceived risk and sharia compliance as environmental factors all positively and significantly impact DBE. Additionally, perceived security has a significant effect on DBE, especially when mediated by perceived ease of use. Furthermore, DBE serves as a crucial mediator between all dimensions of the TOE framework and IMB adoption. This research offers a theoretical contribution by examining the TOE framework dimensions from a customer's perspective, revealing their impact on DBE and IMB adoption. From a managerial perspective, the study provides valuable insights for banks on how to effectively manage technological, environmental, and organizational dimensions to strengthen DBE and promote IMB adoption.

1. Introduction

A digital business ecosystem (DBE) consists of interconnected organizations and individuals that leverage digital tools to create valuable goods or services. The concept, originally introduced by Moore (1993) as an “economic community,” has evolved over time. According to Zhang, Cheng, Fei, and Khanal (2024), a DBE is a digital environment made up of software, hardware, and operational procedures. This ecosystem connects technological foundations with digital services through collaborative platforms, with a primary focus on value generation (Cuel, Ceci, Pappas, & Senyo, 2024; Senyo, Liu, & Effah, 2019). At the heart of the DBE are digital platforms, described as technological frameworks that advance IT capabilities and seamlessly integrate information, computing, and connectivity technologies (Bohnsack, Rennings, Block, & Bröring, 2024; Treiblmaier, 2022). These platforms facilitate interactions and transactions among ecosystem participants,

fostering value creation and driving organizations' digital transformation (Fernández-Portillo, Ramos-Vecino, Ramos-Mariño, & Cachón-Rodríguez, 2024).

The DBE is crucial to the banking industry, providing the technological infrastructure necessary for implementing and managing digital services like mobile banking (m-banking). As part of the DBE, m-banking ensures secure transactions, interoperability, and scalability, allowing the system to support an increasing number of users and transactions without compromising performance (Abdurrahman, Gustomo, Wibisono, & Prasetyo, 2023; Chen et al., 2023). This ecosystem fosters value creation through both collaborative and competitive interactions among key stakeholders, including software developers, hardware manufacturers, service providers, and end-users (Antai & Eze, 2023). Within this environment, stakeholders collaborate to innovate and co-develop new products and services, enhancing the overall value proposition (Fernández-Portillo et al., 2024). For instance, banks within a DBE can

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partner with fintech companies and other entities as orchestrators to integrate cutting-edge technologies into financial services, thereby enhancing service delivery and customer experience (Al-Okaily, 2024; Hanafizadeh & Marjaie, 2021; Koch, Krohmer, Naab, Rost, & Trapp, 2022).

Recognizing the importance of the DBE, banks must manage it as a core capability to facilitate digital transformation (Abdurrahman, Gustomo, & Prasetyo, 2024; Haki, Blaschke, Aier, Winter, & Tilson, 2022). Abdurrahman, Gustomo, and Prasetyo (2024) highlighted poor customer service, linked to inadequate service quality, as a key issue in adopting digital banking ecosystem capabilities. To overcome this, both Abdurrahman, Gustomo, and Prasetyo (2024) and Cuel et al. (2024) suggest that optimizing the DBE is essential for enhancing business performance. This strategy includes improving service quality, utilizing cutting-edge digital technologies, and incorporating data-driven solutions to enhance customer experiences (Abdurrahman, Gustomo, & Prasetyo, 2024; Cuel et al., 2024; Senyo et al., 2019). Moreover, Fernández-Portillo et al. (2024) found that integrating digital technologies within the DBE can significantly increase customer satisfaction, which in turn enhances business outcomes across various sectors, including banking.

The effectiveness of the DBE in the banking sector can be evaluated by examining its impact on the adoption of mobile banking (m-banking). M-banking is the most frequently used digital service among customers, with many banks directing the majority of their digital investments toward it over other services (Adewale & Ismal, 2020; Barroso & Laborda, 2022). Studies by Abdurrahman, Gustomo, and Prasetyo (2024) highlight the importance of ecosystem capabilities in banking, while Fernández-Portillo et al. (2024) and Cuel et al. (2024) emphasize that a well-developed DBE can significantly improve business performance. Additionally, m-banking has a greater impact on company performance than other digital services (Abdennebi, 2023; Alnsour, 2023). However, research on the relationship between DBE and m-banking adoption remains limited. Most previous studies have focused on factors influencing the adoption of mobile banking (Devina, Fernando, & Ikhsan, 2022; Gonçalves et al., 2021). Fernández-Portillo et al.'s (2024) largely examined employees' perceptions of how DBE affects organizational performance, but there is a lack of comprehensive studies from the customer's perspective. Therefore, in the banking industry, it is essential to analyze the factors driving DBE and its influence on m-banking adoption from the customer's viewpoint. This is particularly important as customer loyalty, as part of the DBE, impacts company performance while also being highly dynamic (Barykin, Kapustina, Kirillova, Yadykin, & Konnikov, 2020). Hence, research from the customer's perspective is necessary to better understand the factors influencing the DBE and its effect on m-banking adoption, filling the current research gap. Such a study would contribute to the development of DBE theory and provide valuable insights for banks to manage DBE more effectively, ultimately driving greater m-banking adoption and improving company performance.

This research examines the factors influencing the DBE and its effect on the adoption of IMB in Indonesia, utilizing the Technology-Organization-Environment (TOE) framework. The TOE framework serves as a robust theoretical model for assessing how organizations integrate the DBE within their specific organizational, technological, and environmental contexts. It is particularly suitable for this study due to its flexibility and applicability to various DBE characteristics. These characteristics include an external environment shaped by societal and digital elements, ecosystem members such as businesses, organizations, and customers, and the interactions between these members, involving the exchange of information, resources, cooperation, and collaboration (Barykin et al., 2020). In this context, few researchers have applied the TOE framework to DBE studies. Zhang et al. (2024), for instance, used this framework to enhance resilience in digital innovation ecosystems. The TOE framework has been widely employed in analyzing technology adoption across different fields, such as business intelligence applications, digital banking services (Bany Mohammad, Al-Okaily, Al-Majali,

& Masa'deh, 2022), electronic banking (Kimiagari & Baei, 2022), online banking (Al-Fahim & Abdulghafor, 2022), blockchain technology (Kajla, Sood, Gupta, Raj, & Singh, 2023), and mobile banking (Mujahed, Musa Ahmed, & Samikon, 2022).

Senyo et al. (2019) also emphasized that developing a DBE must address technological challenges, organizational capabilities in business management, and environmental factors. This is particularly relevant for Islamic Mobile Banking (IMB), as it involves technological considerations, banking reputation, and environmental adaptation, such as risk management and Sharia compliance. Islamic banks operate under a unique governance structure, where conventional corporate governance may not fully align with Sharia requirements (Fidhayanti, Mohd Noh, Ramadhita, & Bachri, 2024), which is pertinent to DBE management, as it must conform to social norms and regulations (Barykin et al., 2020). Building on studies in FinTech and mobile money (Al-Okaily & Al-Okaily, 2024; Qatawneh, Al-Okaily, Al-Okaily, & Ur Rehman, 2024), as well as the application of the TOE framework to digital innovation ecosystems (Zhang et al., 2024) this research aims to explore the ongoing intention to use IMB services, assessing how the dimensions of the TOE framework influence the DBE and its critical role in driving IMB adoption.

This study aims to contribute to the development of dimensions based on the TOE framework that influence the DBE from the customer's perspective. Additionally, this research examines the impact of the DBE and customer behavior on IMB adoption, offering a new perspective in DBE and technology acceptance research. The study also provides managerial guidance on how banks can develop the DBE by considering various dimensions that integrate technological and social perspectives to support the successful increase of m-banking adoption. To achieve these goals, the study surveys the perceptions of Indonesian Islamic bank customers regarding DBE and its influence on IMB adoption. The research addresses four research questions: RQ1 investigates the impact of each dimension of the TOE framework on DBE, RQ2 explores how DBE affects IMB adoption, RQ3 examines how DBE as a mediating role affects each dimension of the TOE framework on IMB adoption, and RQ4 examines the moderating role of customer behavior on the relationship between DBE and IMB adoption.

The research is organized into seven main sections. The second section outlines the theoretical foundations and conceptual framework of the study. The third section details the research methods employed. The fourth section presents the findings and results. The fifth section discusses the significance of these findings in addressing the research questions. The sixth section examines the study's limitations and implications. The seventh section concludes with a summary of the key findings and research objectives. Lastly, the eighth section outlines the study's limitations and offers suggestions for future research.

2. Literature review and hypotheses development

In the context of the digital economy, the DBE signifies a transformative structure propelled by the widespread embrace of digital technologies (Barykin et al., 2020). In the banking industry, the DBE has become pivotal in driving customer satisfaction through enhanced convenience, accessibility, and personalized experiences (Al-Naimi, Al Abed, Farooq, Qasaimeh, & Alnaimat, 2023; Antai & Eze, 2023; Hanafizadeh & Kim, 2020). Unlike traditional ecosystems characterized by competition, DBE fosters collaboration among participants, promoting mutual assistance and shared value creation (Barykin et al., 2020; Senyo et al., 2019). This cooperative method is crucial for enhancing customer satisfaction and optimizing operational effectiveness, and driving innovation in banking services (Cuel et al., 2024). Moreover, the shift toward expanded collaboration among economic agents (banks and customers) within these ecosystems reflects a broader trend toward leveraging digital transformation to achieve collective growth and sustainability in the banking sector (Bernini, Ferretti, & Angelini, 2022; Forcadell, Aracil, & Úbeda, 2020; Pelgander, Öberg, & Barkenäs, 2022).

IMB is deeply integrated into the modern digital environment, merging the foundational principles of Islamic finance with the ease and advancements of mobile technology. Within this framework, IMB offers various financial services that comply with Sharia compliance, facilitated through user-friendly mobile applications that prioritize accessibility and convenience for Islamic finance adherents (Fidhayanti et al., 2024; Usman, Projo, Chairy, & Haque, 2022). Furthermore, the DBE strengthens trust and transparency through robust technological implementations, organizational strategies, and environmental factors, as advocated by Cuel et al. (2024). These enhancements drive ongoing enhancements and expansion within the sector.

According to the research by Barykin et al. (2020) and Fernández-Portillo et al. (2024), the DBE positively impacts business performance, as evidenced by the high number of customers adopting IMB. Consequently, this study explores and examines various factors influencing DBE through the TOE framework (Tornatzky, Fleischer, & Chakrabarti, 1990), highlighting the integration of technology, organization, and environmental adaptability. The selection of the TOE model as the theoretical framework in this study is due to the complex elements that decision-makers may encounter, including the uncertainties, risks, and out-of-equilibrium impacts of the DBE's effect on IMB adoption due to its socio-technical nature (Bayat, Daraei, & Rahimikia, 2022; Dudin, Shkodinskii, & Usmanov, 2021).

The application of the TOE framework has evolved to include a customer-centric perspective in digital business research, transitioning from a traditional organizational lens. This shift has been demonstrated across various industries, such as retail (Raveena, Alexander, & Rukshan, 2023), digital marketing (Rehman et al., 2024), and online commerce (Nguyen, Le, & Vu, 2022). In digital banking research, the TOE framework has been extensively applied from a customer perspective to explore how various factors influence adoption. Studies indicate that technological aspects such as ease of use, security, and system quality, along with organizational elements like management support and ICT readiness, are crucial (Wirani, Hidayanto, & Shihab, 2020). Environmental influences, including government backing and initial trust, also play a significant role in shaping user behavior (Kimiagari & Baei, 2022). Incorporating customer-centric insights into the TOE framework has deepened the understanding of digital banking adoption, highlighting how customer attitudes, perceptions, and interactions with technological, organizational, and environmental dimensions drive digital transformation in the banking sector.

Findings from studies on the use of the TOE framework from a customer perspective provide inspiration for expanding research on its application within the DBE. Given that studies in this area remain limited, this research becomes significant for advancing the TOE framework's theoretical development for the DBE, aimed at enhancing IMB adoption. The integration between the TOE framework and the customer-centric context of DBE and IMB adoption can be described by examining how each dimension of the framework influences customer behavior and shapes their adoption decisions. This approach shifts the focus from an organizational lens to a more customer-oriented perspective, enhancing the theoretical contributions of the study. The technological dimension encompasses factors such as perceived usefulness, ease of use, and security, which directly influence customer behavior in the context of IMB adoption. According to the Technology Acceptance Model (TAM), system usage is significantly impacted by users' attitudes toward the system's perceived usefulness and ease of use (Sasidharan & Venkatakrishnan, 2024). Perceived usefulness refers to a customer's belief that using IMB will enhance their financial management, while perceived ease of use reflects the belief that it will be straightforward and effortless (Johnen, Parlasca, & Mußhoff, 2023). However, one major concern for customers engaging in digital financial transactions is perceived security. Research shows that users often view digital payment systems with caution due to potential risks of hacking and data breaches (Badran et al., 2024; Pinto & Sobreiro, 2022). Addressing these concerns is crucial, as customer behavior is strongly

influenced by how secure they perceive the platform to be (Candiwan & Rianda, 2024).

The organizational dimension focuses on elements such as the bank's reputation and its capacity for innovation, which can significantly impact customer trust and satisfaction. Customers often evaluate the quality and reliability of a banking service based on the institution's reputation (Sebayang, Hakim, Bakhtiar, & Indrawan, 2024b). A well-regarded bank that demonstrates commitment to continuous innovation can enhance customer confidence, thereby influencing their decision to adopt IMB services (Zhang et al., 2024). This highlights the importance of strong organizational management in fostering a trustworthy and dynamic DBE that meets customer expectations.

The environmental dimension considers external factors such as perceived risk, regulatory compliance, and socio-cultural pressures that affect customer behavior. Risk perception, including concerns over service reliability and transaction errors, can impact the likelihood of IMB adoption (Badran et al., 2024). Adherence to Sharia compliance is particularly critical for customers in Islamic banking, as it aligns with their religious beliefs and ensures that financial products and services adhere to Islamic principles (Fidhayanti et al., 2024; Usman et al., 2022). Moreover, customer behavior itself acts as an influential factor within the environmental dimension, shaping how individuals interact with the DBE based on their comfort with and trust in digital services (P. Kumar, Chauhan, Kumar, & Gupta, 2024). In this context, the study serves to broaden the scope of the TOE framework as illustrated in the Fig. 1 as follows:

2.1. DBE and IMB adoption

A critical development in modern ecosystems is the integration of a unified digital environment across various economic sectors, including banking, trade, logistics, and customer services (Chen, Sloggy, et al., 2023; Chen, Wang, & Ortiz, 2023). In the digital era, conventional business collaboration networks have transformed into a new ecosystem characterized by cross-industry, mutually beneficial interactions. Thus, in this research, DBE typically involve diverse, complementary firms working together to achieve a common value proposition. A study by Barykin et al. (2020) highlighted the importance of DBE in providing support for sustainable business models. Similarly, research by (Chen, Wang, & Ortiz, 2023) shows promise in enhancing sustainability within DBE. Therefore, further study is needed to determine the influence of DBE on technology adoption.

The success of digital transformation relies not only on automating processes but also on improving them to generate customer value (Abdurrahman, Gustomo, & Prasetyo, 2023; Royo-Vela, Frau, & Ferrer, 2024). In a DBE, customer satisfaction is achieved by providing customers with information on how effectively a company meets their needs (Hidayat & Idrus, 2023). Thus, customer satisfaction is evaluated based on how well a product or service fulfills consumer expectations, reflecting the alignment between their expectations and their actual experience (Zariman, Humaidi, & Abd Rashid, 2022). Previous research indicates that DBE platforms are significantly influenced by factors such as ease of use, risk, accessibility, and relative advantage (Gezahegn, Durie, & Kibret, 2024), as well as information quality and security (Zaato et al., 2023). Based on this understanding, the hypothesis can be formulated as follows:

H1. *The DBE has a significant positive influence on IMB adoption.*

2.2. Technology dimension

2.2.1. Perceived usefulness

Understanding the relationship between the technology dimension, the DBE, and IMB adoption is crucial for recognizing how technological factors impact customer experience and the acceptance of digital banking services. Perceived usefulness as part of the technology

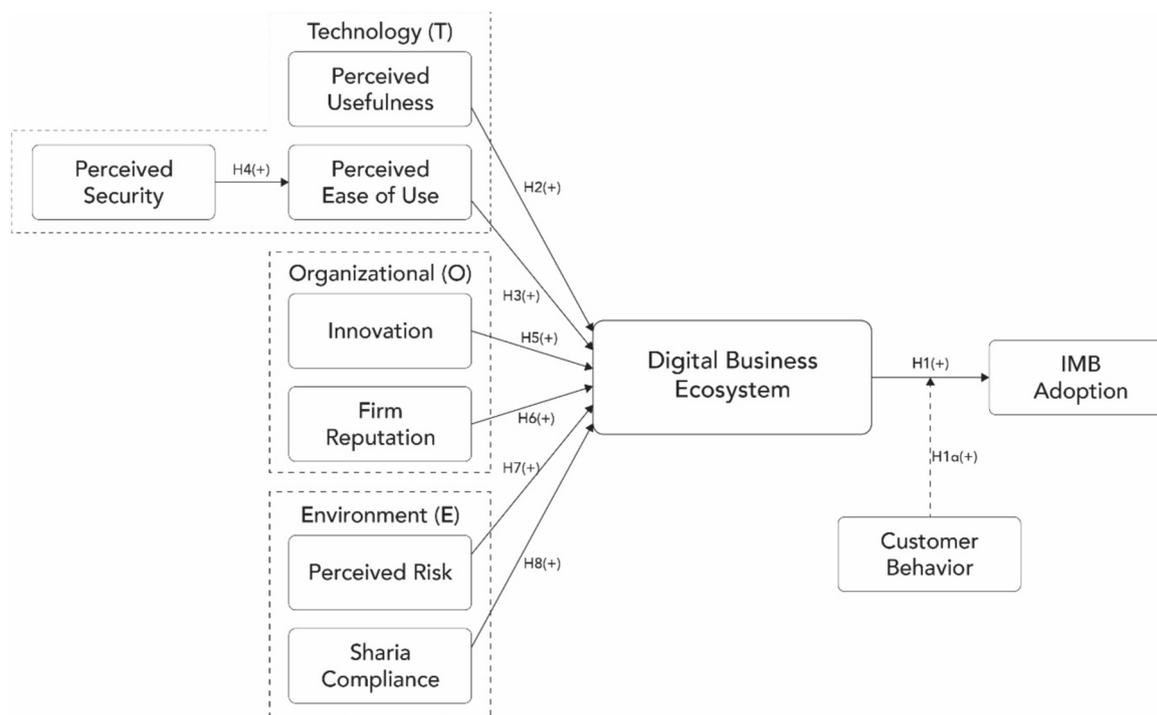


Fig. 1. Conceptual framework.

dimension, has been extensively studied in previous research (Alnemer, 2022; Johnen et al., 2023; Sasidharan & Venkatakrishnan, 2024). These factors play a key role in shaping user engagement with digital banking platforms by directly affecting their efficiency, effectiveness, and security (Cuel et al., 2024). When users perceive the technology as user-friendly, reliable, and beneficial for their banking needs, their satisfaction with the DBE increases, promoting further adoption and continued use.

Perceived usefulness is a fundamental factor within the technology dimension. It refers to the extent to which users believe that using IMB enhances their ability to complete banking tasks more effectively. When users perceive IMB as useful, it enhances their overall experience and encourages more frequent engagement with the platform. For example, when users recognize that IMB helps them manage their finances more efficiently (Anouze & Alamro, 2020), they are more likely to incorporate it into their daily routines. This positive perception of the platform's value boosts satisfaction and trust, driving further adoption. As users experience improvements in managing their financial tasks, they become more reliant on the platform, signaling the value they place on its usefulness. The perceived usefulness of IMB directly influences how often users engage with the platform, making it an integral part of their daily financial activities (Jing, 2022). As highlighted by users who rely on IMB to complete all necessary transactions, this perception helps integrate IMB seamlessly within the broader digital ecosystem, fostering long-term adoption and usage (Jing, 2022).

Furthermore, perceived usefulness strengthens user loyalty and promotes long-term adoption. When users view IMB as a tool that simplifies their tasks, saves time, and increases productivity, they are more likely to continue using it over time. As reflected in user loyalty (Wu et al., 2022), this satisfaction fosters continued reliance on IMB as the primary mobile banking solution. By reinforcing its perceived usefulness, IMB becomes an indispensable tool for users, driving its continued adoption within the ecosystem.

The relationship between perceived usefulness and IMB adoption is further influenced by the broader context of the DBE. When users perceive IMB as a valuable tool, their satisfaction with the DBE increases, leading to more significant engagement with other digital

services. This engagement creates a positive feedback loop that strengthens users' connection to the ecosystem and encourages ongoing adoption of IMB.

Building on prior research, this study proposes the following hypotheses:

H2. *Perceived usefulness has a significant positive impact on the DBE.*

H2a. *DBE mediates the relationship between perceived usefulness and IMB adoption.*

2.2.2. Perceived ease of use

Perceived ease of use is a key factor in shaping customer experiences and driving the adoption of IMB within the DBE. It refers to how users perceive the technology as being simple to operate and navigate without much effort. For IMB, perceived ease of use significantly impacts how users engage with and accept the technology for their financial transactions.

When users view IMB as easy to use, it reduces barriers to engagement and creates a more favorable experience. For example, when users perceive IMB as easy to use (George & Sunny, 2021) and straightforward (Anouze & Alamro, 2020), they are more likely to experience higher satisfaction with the platform. This positive perception encourages users to engage with IMB services more often, as they feel confident using it for their daily banking tasks. The ease of use directly contributes to the efficiency and convenience of making financial transactions within the DBE (Jing2022). As highlighted by users who find IMB intuitive and simple, they are more inclined to integrate it into their regular banking routine, relying on it to complete all necessary financial transactions across the ecosystem (Jing, 2022).

Moreover, perceived ease of use enhances the value of the IMB technology within the DBE. When users find IMB easy to navigate, they are more likely to incorporate it into their daily financial activities, leading to greater engagement with the wider ecosystem. This increased use fosters smoother interactions with other digital services, building trust and satisfaction (George et al., 2022). As users report feeling pleased with IMB and expressing a preference for it over other mobile banking options, this positive experience deepens their reliance on the

platform and strengthens overall satisfaction.

Perceived ease of use is closely linked to the perceived usefulness of the IMB platform (Anouze & Alamro, 2020). When users find the technology easy to navigate, they are more likely to see it as an efficient tool for managing their banking tasks. This perception of ease enhances the platform's value, as users recognize the time-saving, convenience, and efficiency it offers (Anouze & Alamro, 2020). As a result, users are encouraged to engage with the platform more regularly, seeing it as a reliable resource for completing their financial transactions.

Ultimately, the perceived ease of use has a direct impact on IMB adoption. Users who find IMB easy to use are more inclined to make it their primary banking solution, integrating it into their daily routines (Anouze & Alamro, 2020). This consistent use fosters long-term engagement (Anouze & Alamro, 2020), as users become more reliant on the platform for their banking needs. As a result, their satisfaction with IMB grows, reinforcing their preference for it over other banking services (Cuel et al., 2024) and leading to successful adoption (George et al., 2022).

Furthermore, perceived ease of use serves as a mediator between technology adoption and the success of the DBE. When users find IMB easy to use, their satisfaction with the DBE increases, which, in turn, boosts the likelihood of adopting IMB services (Alnemer, 2022; Johnen et al., 2023; Sasidharan & Venkatakrishnan, 2024). Based on this, the following hypotheses are proposed:

H3. *Perceived ease of use positively influences the DBE.*

H3a. *DBE mediates the relationship between perceived ease of use and IMB adoption.*

2.2.3. Perceived security

Security is a primary concern for users when it comes to financial transactions. Perceived security refers to consumers' subjective assessment of the likelihood that their personal information will remain safe from unauthorized access, storage, or modification (Candiwan & Rianda, 2024). Within the Technology dimension of the TOE framework, perceived security is particularly vital for enhancing the adoption of IMB in a DBE. It plays a critical role in building trust among users, thereby increasing their confidence in using IMB services. For example, users' feelings of security when sharing sensitive information (Anouze & Alamro, 2020) significantly influence their willingness to engage with the technology. Additionally, a strong reputation for security bolsters this trust, as evidenced by the positive perceptions of banks providing these services (Jin, Park, & Kim, 2010).

Moreover, perceived security alleviates users' concerns about risks such as data breaches and unauthorized access (Lee, 2009), effectively reducing the perceived risks associated with online banking. This sense of security enhances the user experience by making the IMB platform easier to use (George & Sunny, 2021) and facilitating seamless interactions that promote engagement. For IMB users, it is also essential that security measures align with Shariah compliance (Zouari & Abdelhedi, 2021), as this alignment is crucial for gaining the trust of Muslim customers.

By prioritizing security, organizations can foster collaboration within the DBE, attract partnerships, and broaden their service offerings. High perceived security directly impacts adoption rates, encouraging users to opt for IMB over traditional banking methods (Anouze & Alamro, 2020) and fostering long-term loyalty, as satisfied users are likely to continue using services they trust (George et al., 2022). In a crowded market, a strong focus on perceived security can provide a competitive advantage, distinguishing banks that prioritize user safety and promoting organic growth through positive word-of-mouth recommendations.

Despite these efforts, many users still perceive digital payment systems as insecure due to the risk of hacking (Arenas, Ray, Hidalgo, & Uruña, 2024). As a result, perceived security remains one of the most significant challenges faced by users of digital payment systems

(Qatawneh et al., 2024). This challenge involves anticipating and mitigating risks that could harm the economy, including data source or network damage, data collection and manipulation, denial-of-service attacks, fraud, and misuse of power. Within this context, the security dimension exerts a significantly positive influence on mobile banking adoption (Candiwan & Rianda, 2024; Qatawneh et al., 2024).

Based on this rationale, the following hypotheses are proposed:

H4. *Perceived security has a significant positive impact on perceived ease of use.*

H4a. *Perceived ease of use positively and significantly mediates the relationship between perceived security and DBE.*

2.3. Organization dimension

2.3.1. Innovation

Innovativeness, which is characterized by an individual's willingness to explore and experiment with new technologies and learn about them (Marinakis, Walsh, & White, 2024), is central to the organizational approach to mobile banking adoption. Innovation is defined as the readiness to adopt new products, technologies, or services (Abdurrahman, Gustomo, Prasetyo, & Rustiadi, 2022; Hassan, Meisner, Krause, Bzhalava, & Moog, 2023). In this study, the innovativeness aspect within the organizational dimension refers to the intent to lead the adoption of mobile banking technologies (Fahad & Shahid, 2022; Shaw, Eschenbrenner, & Brand, 2022).

Users are particularly drawn to IMB when it offers services and features that outperform those of competing mobile banking platforms. The concept of competitive advantage through innovation (F. Hasan, Agustian, Setiawan, & Siddiq, 2019) underscores how IMB's unique benefits encourage users to adopt it, as they see it as a more advanced and reliable solution for managing their finances. Similarly, this competitive advantage highlights the distinctiveness of IMB's offerings, positioning it as an essential element within the DBE. The continuous innovation within IMB plays a critical role in driving its adoption and fostering deeper user engagement.

Additionally, the ongoing innovation (F. Hasan et al., 2019) reinforces the idea that users are more likely to remain loyal to IMB when they perceive it as a platform that evolves with their changing needs. In a rapidly shifting digital environment, continuous innovation ensures that IMB stays relevant, promoting long-term adoption and sustained user engagement within the DBE.

Innovation within the organizational dimension significantly impacts the overall functionality of the DBE by enhancing the services and features available to users. When IMB introduces new functionalities, users experience greater satisfaction and are more likely to rely on it for their banking needs. The reliability and utility (F. Hasan et al., 2019) of IMB, driven by its innovative features, play a central role in the platform's integration within the broader ecosystem, making it an essential tool for users. A more focused evaluation of IMB adoption is necessary to fully understand its impact. Additional research indicates that innovation, particularly when aligned with the DBE, can increase profits (Bohnsack et al., 2024) and enhance organizational resilience through effective interactions (Zhang et al., 2024).

Based on this reasoning, the following hypotheses are proposed:

H5. *Innovation has a significant positive impact on the DBE.*

H5a. *DBE positively and significantly mediates the relationship between innovation and IMB adoption.*

2.3.2. Firm reputation

The firm reputation construct, as part of the organizational dimension in the context of the DBE, plays a significant role in influencing the adoption of IMB. A firm's reputation is crucial in the banking sector, where services are intangible and can easily be replicated by competitors (Behera, Bala, Rana, & Kizgin, 2022). The reputation of the bank

providing the IMB service can significantly impact customers' perceptions of trust, reliability, and confidence. These factors are essential in shaping customers' decisions, particularly in the context of financial services, where trust and security are of utmost importance.

A bank's positive reputation directly influences how users perceive the quality and dependability of IMB (Sebayang et al., 2024b). Customers tend to trust platforms associated with reputable institutions, as they believe such banks are more likely to offer secure, reliable, and high-quality services. This perception of trustworthiness and reliability makes users more likely to adopt and remain loyal to IMB services.

The firm reputation also helps mitigate perceived risks associated with digital banking services, as reputation often acts as a buffer against uncertainties and concerns about security and service quality (Sebayang, Hakim, Bakhtiar, & Indrawan, 2024a). When users have confidence in the reputation of the bank behind the IMB service, they feel more secure engaging with the platform, reducing their perceived risk (Che et al., 2023). This, in turn, leads to increased satisfaction and continued use of IMB services.

A positive reputation, therefore, not only enhances trust but also positions IMB as a reliable and essential service within the DBE. This reputation strengthens user confidence and contributes to IMB's adoption and long-term success. Users who perceive the platform as trustworthy (Jing, 2022) are more likely to integrate IMB into their daily financial activities, relying on it to complete all essential tasks.

Based on these insights, the research proposes the following hypotheses:

H6. *Firm Reputation has a significant positive impact on the DBE.*

H6a. *The DBE positively and significantly mediates the relationship between Firm Reputation and IMB adoption.*

2.4. Environment dimension

2.4.1. Perceived risk

Perceived risk, as part of the environmental dimension, plays a significant role in shaping the adoption of IMB within the DBE. Perceived risk refers to the anxiety users experience about potential negative outcomes, such as financial loss, fraud, or identity theft, which can occur while using mobile banking services (Jena, 2022). These concerns can vary depending on the user's experience, knowledge, and trust in the system (Yang, Yang, Hou, Li, & Sun, 2023). In the context of IMB, managing perceived risks is crucial for encouraging users to adopt the service, as their confidence in the platform's security and reliability influences their willingness to use it.

Effective risk mitigation strategies are essential in overcoming these concerns and improving the adoption of IMB (Sasidharan & Venkatakrishnan, 2024). As highlighted by Lee (2009), users' perception of risk can affect their decision to engage with IMB services. When users believe that the platform effectively manages and reduces these risks, they are more likely to trust the system and continue using it (Badran et al., 2024), thus contributing to its adoption. On the other hand, if users perceive significant risks, such as unauthorized access or transaction errors (Lee, 2009), their willingness to adopt IMB decreases.

Moreover, in the context of Sharia compliance, ensuring that IMB follows Islamic principles not only aligns with religious beliefs but also helps reduce perceived risks among users. If users trust that the system adheres to ethical and Sharia-compliant practices, they are less likely to perceive it as risky, fostering higher engagement and trust (Zouari & Abdelhedi, 2021).

In the broader scope of the DBE, the perceived risk associated with IMB is interconnected with the platform's ability to ensure smooth and secure interactions. As users rely on the ecosystem to complete financial transactions (Jing, 2022), any risks perceived in one area can influence their trust and interaction with the entire ecosystem. Therefore, reducing perceived risk within the DBE is essential for enhancing user engagement and promoting long-term adoption.

Based on these insights, this study proposes the following hypotheses:

H7. *Perceived risk has a significant positive impact on the DBE.*

H7a. *The DBE positively and significantly mediates the relationship between perceived risk and IMB adoption.*

2.4.2. Sharia compliance

Sharia compliance is a crucial construct within the environmental dimension in the context of DBE and IMB adoption. Sharia compliance ensures that mobile banking services, particularly in Islamic banking, adhere to the ethical and religious guidelines of Islam, distinguishing them from conventional banking services. It covers important aspects such as avoiding interest (*riba*), ensuring transactions are conducted in a halal manner, and aligning financial services with Islamic principles (Zouari & Abdelhedi, 2021).

Sharia compliance is fundamental in distinguishing Islamic banks from their conventional counterparts (Jan & Ismail, 2023). In the digital age, where Islamic banks must enhance their digital capabilities, Sharia compliance is even more crucial. For instance, IMB services must not only focus on offering technological advancements but also ensure that these services remain compliant with Sharia principles to maintain user trust and satisfaction (Usman et al., 2022).

In the context of a DBE, where services are increasingly digitalized, the perception of Sharia compliance can directly influence the adoption and continued use of IMB services. According to previous research, Sharia compliance, when combined with digital transformation in Islamic banking, positively affects customer satisfaction and loyalty (Adewale & Ismail, 2020). This is particularly important as Islamic financial services need to cater to a customer base that is highly sensitive to ethical and religious considerations, and the perception of non-compliance could severely hinder adoption (Zouari & Abdelhedi, 2021).

The environmental dimension, including Sharia compliance, also interacts with the broader DBE by influencing user perceptions of risk and security. As digital services increase, users expect to receive transparent and Sharia-compliant offerings that are also secure (Fitri, 2021). In this regard, IMB's commitment to Sharia compliance is essential in reducing perceived risk among users, especially in financial transactions that must align with Islamic ethical standards (Zouari & Abdelhedi, 2021).

As the DBE is increasingly seen as a platform that integrates not only technological advancements but also ethical and religious compliance, Sharia compliance remains a key driver in fostering trust and customer engagement (Fitri, 2021; Usman et al., 2022). Based on these insights, the study proposes the following hypotheses:

H8. *Sharia compliance has a significant positive impact on DBE.*

H8a. *DBE positively and significantly mediates the relationship between Sharia compliance and IMB adoption.*

2.4.3. Customer behavior

Customer behavior plays a significant role as a moderating variable between the DBE and IMB adoption. It encompasses the motivations, attitudes, and preferences that drive individuals to engage with products or services, such as choosing to adopt mobile banking services (Tian et al., 2022). Understanding customer behavior is crucial for effectively enhancing the adoption of new technologies like IMB. Without insights into these behaviors, the introduction of new products can face challenges, and failures become more likely (Siagian, Tarigan, Basana, & Basuki, 2022).

In the context of IMB adoption, customer behavior is particularly important. Research by Jamshidi and Kazemi (2020) indicates that customer behavior significantly influences satisfaction with Islamic digital banking. The level of satisfaction, in turn, impacts how effectively the DBE can influence the adoption of IMB services. As more customers become familiar with digital banking, their behaviors and

preferences evolve, impacting the overall penetration of IMB usage.

Customer behavior shapes how users perceive the DBE and its integration with IMB adoption. For instance, users who are motivated to use IMB services due to convenience, security, and Sharia compliance are more likely to engage with the broader DBE and adopt IMB for their financial needs. This engagement creates a feedback loop that strengthens the user's reliance on the system, as indicated by [Jing \(2022\)](#). Therefore, customer behavior acts as a mediator in this relationship, influencing the strength of the connection between DBE and IMB adoption. Based on these insights, the following hypothesis is proposed:

H1a. *Customer behavior positively and significantly moderates the relationship between DBE and IMB adoption.*

3. Research methods

This study employed a structured questionnaire for quantitative research to examine the factors influencing DBE and its impact on IMB adoption. The initial part of the survey focuses on collecting demographic data and includes filtering questions. Participants are asked about their age, education level, and duration of IMB usage. The second section of the questionnaire assesses the constructs identified in the literature and integrates them within the TOE framework. These constructs and their origins are detailed in [Table 2](#). Responses were collected using a 5-point Likert scale (ranging from 1 for strongly disagree to 5 for strongly agree), and the adapted scale underwent reliability and validity testing using appropriate methodologies ([Sharma, Sarstedt, Shmueli, Kim, & Thiele, 2019](#)). Respondents were selected from several randomized districts, representing the entire Indonesian population due to the region's diverse demographic composition ([Sarstedt, Nitzl, & Howard, 2020](#)).

PLS-SEM is particularly well-suited for testing the hypotheses in this model due to several factors. The model integrates multiple constructs, including perceived security, ease of use, usefulness, innovation, firm reputation, perceived risk, and Sharia compliance, each contributing to the overall DBE and its impact on IMB adoption. PLS-SEM is effective in handling complex models with numerous constructs and paths, allowing for a more comprehensive analysis ([Sarstedt, Ringle, & Hair, 2022](#)). Additionally, PLS-SEM is known for its predictive capabilities, making it ideal for models aimed at understanding and forecasting relationships ([Creswell & Creswell, 2018](#)). Given that this research seeks to explore how different factors within the DBE contribute to IMB adoption and how customer behavior moderates this relationship, PLS-SEM's emphasis on prediction is highly beneficial. Another advantage is that PLS-SEM does not require strict assumptions of multivariate normality, making it advantageous that the data does not follow a normal distribution, a common occurrence in real-world studies ([Sarstedt et al., 2022](#)). Lastly, PLS-SEM is suitable for exploratory studies that involve relatively new constructs or novel applications of frameworks ([Sarstedt et al., 2022](#)) like the TOE, as it focuses on maximizing explained variance. This approach aligns with the objective of testing hypotheses and understanding the practical impact of customer behavior in moderating the DBE's influence on IMB adoption. Considering the advantages of PLS-SEM, this method is also used by many other researchers in relation to TOE framework ([Abdurrahman, Gustomo, & Agus, 2024](#); [Cruz-Jesus, Pinheiro, & Oliveira, 2019](#); [Nikopoulou, Kourouthanassis, Chasapi, Pateli, & Mylonas, 2023](#); [Tijan, Jović, Aksentijević, & Pucihar, 2021](#)) and digital banking adoption ([Kajol, Singh, & Paul, 2022](#); [Mefoute Badiang & Nkwei, 2024](#); [Mulazid et al., 2024](#); [Royo-Vela et al., 2024](#)). To conduct the PLS-SEM analysis, this study utilized Smart PLS software to assess both the measurement and structural models ([Magno & Ringle, 2022](#)).

3.1. Sample and demographic characteristics

1200 questionnaires were disseminated through an online survey with Google Forms, and 985 individuals completed the questionnaire. These people are already used to technology for various reasons, which may suggest a degree of comfort affecting their propensity to use mobile phones for banking transactions. Data were gathered between October 1, 2023, and December 30th, 2023, as described in [Table 1](#) as follows.

3.2. Measurement model

In this study, each dimension within the TOE framework was operationalized using specific items to reflect the perceptions of customers regarding the DBE and its influence on IMB adoption, based on established sources. For the Technology dimension, perceived ease of use and perceived usefulness were captured through items evaluating how straightforward and beneficial users found the IMB, sourced from studies by [George and Sunny \(2021\)](#) and [Lee \(2009\)](#). Perceived security was operationalized with items that assessed users' confidence in transmitting sensitive information, referencing [Anouze and Alamro \(2020\)](#).

In the Organization dimension, firm reputation and innovation were measured by items relating to the bank's perceived reputation and the innovative services of the IMB, drawing from [Jin et al. \(2010\)](#) and [F. Hasan et al. \(2019\)](#). The Environment dimension included perceived risk, assessing concerns like unauthorized access and transaction errors, and Sharia compliance, which focused on the adherence of IMB services to Islamic principles, as cited from [Lee \(2009\)](#) and [Zouari and Abdelhedi \(2021\)](#). These operationalizations ensured that the model accurately captured the customer-centric aspects of each TOE dimension, providing a robust framework for examining how these factors interact with the DBE to impact IMB adoption.

The evaluation included four tests for DBE, three tests for IMB adoption, six tests for customer behavior, seven tests evaluating perceived ease of use, nine items measuring perceived usefulness, three tests for perceived security, three tests for firm reputation, three tests for innovation, six tests for perceived risk, and three tests for Shariah compliance. [Table 2](#) details the meticulous selection process that went into selecting these parts, which included considering their demanding outer loads and consulting reputable journals to ensure the accuracy and dependability of the instruments.

Table 1
Descriptive statistics of respondents.

Description	Category	Number	Percentage
Age	17–25	252	25.6 %
	26–35	277	28.1 %
	36–45	258	26.2 %
	>45	198	20.1 %
Job	Education	217	22.0 %
	Consultation	29	2.9 %
	Banking	156	15.8 %
	Manufacture	8	0.8 %
	Government	225	22.8 %
	Contractor	22	2.2 %
	Others	328	33.3 %
Education	High School	221	22.4 %
	Diploma	107	10.9 %
	Bachelor	495	50.3 %
	Master	126	12.8 %
	Doctoral	36	3.7 %
Length of time using digital banking services	1–5	635	64.5 %
	6–10	204	20.7 %
	11–15	78	7.9 %
	>15	68	6.9 %

Table 2
Measurement items.

Variable	Code	Item	Sources
DBE	DBE 1	When I use IMB as a DBE, I can easily make financial transactions anywhere and anytime.	Jing (2022)
	DBE 2	I rely heavily on IMB as a DBE because it enables me to complete all the required financial transactions.	Jing (2022)
	DBE 3	I am pleased with IMB as a DBE and do not intend to use other mobile banking services.	Wu et al. (2022)
	DBE 4	I am pleased with IMB as a DBE and will consider utilizing its services.	Wu, Liang, and Chen (2022)
IMB Adoption	IMB 1	I use IMB often	Anouze and Alamro (2020)
	IMB 2	I utilize IMB more often compared to traditional banking.	Anouze and Alamro (2020)
	IMB 3	I primarily rely on IMB for my banking needs.	Anouze and Alamro (2020)
Customers Behavior	CB 1	I have the resources necessary to use IMB transactions.	Anouze and Alamro (2020)
	CB 2	I know that IMB transactions are necessary.	Anouze and Alamro (2020)
	CB 3	I feel comfortable using IMB when there is an integrated online 'help' feature available for assistance	Anouze and Alamro (2020)
	CB 4	I feel assured using IMB even when relying solely on online instructions for guidance	Anouze and Alamro (2020)
	CB 5	I consistently stay updated on digital banking trends, which can impact my decisions when selecting mobile banking services.	Anouze and Alamro (2020)
	CB 6	When choosing to use mobile banking, I consistently assess the speed, accuracy, and comprehensiveness of its features	Anouze and Alamro (2020)
Technology dimension			
Perceived Ease of Use	PE 1	IMB is easy to use	George and Sunny (2021)
	PE 2	Become skillful in using IMB is easy	George & Sunny (2021)
	PE 3	I believe that mastering the use of IMB would be straightforward	Lee (2009)
	PE 4	I believe that using IMB does not demand significant mental effort	Lee (2009)
	PE 5	I use an IMB without any help	Lee (2009)
	PE 6	I use IMB without any problem.	Lee (2009)
	PE 7	In general, I perceive IMB to be straightforward to use	Anouze and Alamro (2020)
Perceived Usefulness	PU 1	Using IMB would help me complete tasks more efficiently	Anouze and Alamro (2020)
	PU 2	Using IMB would simplify the execution of my tasks	Anouze and Alamro (2020)
	PU 3	IMB saves time.	George & Sunny (2021)
	PU 4	IMB is available at any time.	George and Sunny (2021)
	PU 5	IMB is less expensive.	George and Sunny (2021)
	PU 6	Overall, I believe that using IMB is beneficial	George and Sunny (2021)
	PU 7	I think the use of IMB improves my banking operations.	George and Sunny (2021)
	PU 8	Using IMB enhances my productivity.	George and Sunny (2021)
	PU 9	I find IMB useful in my living and working activities.	George & Sunny (2021)
Perceived Security	PSC 1	I would feel confident transmitting sensitive information through the banking system as a whole	Anouze and Alamro (2020)
	PSC 2	I would feel secure sharing sensitive personal information via IMB	Anouze and Alamro (2020)
	PSC 3	Overall, IMB is a secure platform for sending sensitive information	Anouze and Alamro (2020)

Table 2 (continued)

Variable	Code	Item	Sources
Organization dimension			
Firm Reputation	FR 1	The bank offering the IMB service I use has a positive reputation	Jin et al. (2010)
	FR 2	The bank associated with the IMB service I use is widely acknowledged	Jin et al. (2010)
	FR 3	The bank providing the IMB service I use offers excellent services	Jin et al. (2010)
Innovation	INN 1	I use IMB because it has better services and features than others.	F. Hasan et al. (2019)
	INN 2	I use IMB because it offers services and features I cannot find in other mobile banking services.	F. Hasan et al. (2019)
	INN 3	I use IMB because its services and features are consistently updated.	F. Hasan et al. (2019)
Environment dimension			
Perceived Risk	PR 1	I think if I use IMB, I will reduce the risk of errors	Lee (2009)
	PR 2	I have concerns about using IMB due to the potential for unauthorized access to my account	Lee (2009)
	PR 3	IMB might face performance issues due to slow download speeds, server downtime, or maintenance of the service	Lee (2009)
	PR 4	The servers of IMB may experience performance issues leading to incorrect processing of payments	Lee (2009)
	PR 5	When there are transaction errors, I'm concerned about not receiving compensation from the bank	Lee (2009)
	PR 6	If my bank account experiences fraud or a hacker gains access, there is a risk of losing status within my social circle	Lee (2009)
Syaria Compliance	SC 1	IMB is run in Islamic principles	Zouari and Abdelhedi (2021)
	SC 2	In IMB, no interest is accrued or charged on savings and loans	Zouari and Abdelhedi (2021)
	SC 3	IMB provides Islamic products and services	Zouari and Abdelhedi (2021)

3.3. Common method bias

There is just one source of data, which is common method bias (CMB) sometimes develops, casting doubt on the results, particularly in quantitative research that primarily relies on self-reported information (Avolio, Waldman, & Yammarino, 1991; Spector, 2006). In this research, two strategies are employed to address the risk of CMB: one involves meticulous design processes, and the other entails rigorous statistical monitoring (Reio, 2010). Several procedural design strategies can mitigate CMB, such as allowing respondents to provide anonymous answers, keeping the questionnaire concise, placing demographic queries toward the end, and conducting pre-testing before actual data collection. These steps are integral to the questionnaire preparation process, fifteen customers who were not a part of any survey group were asked for their feedback to assess the clarity of the questions and identify any potential duplication. The coherence, meaning, and sentence structure of the connections between the questions were all enhanced by using this input.

Two techniques were applied to provide statistical control. Initially, outside loadings were calculated, and the potential for common method bias was assessed using Harman's one-factor test (Fuller, Simmering, Atinc, Atinc, & Babin, 2016; Podsakoff, MacKenzie, & Podsakoff, 2012). The second approach was a collinearity test in which all constructs' Variance Inflation Factors (VIF), which indicate the degree of multicollinearity, were assessed. The purpose of this analysis was to find and fix any possible problems with multicollinearity between the study's

variables (Hair et al., 2021). Both approaches were used in the manner described in Table 4. The findings show that the VIF values are less than five and all constructions have outer loading values more than 0.5. Hence, it can be inferred that our model seems to be devoid of issues related to CMB.

4. Data analysis

Cronbach’s alpha was used to validate the internal consistency of the statements, ensuring the reliability of the selected constructs. The study also evaluated the discriminant and convergent validity of the collected data. Significant correlations among the items were identified using structural equation modeling (SEM), followed by confirmatory factor analysis (CFA) to assess cross-loadings on inactive components.

4.1. Reliability and validity analysis

The base of model assessment is dependability measurement, which is crucial. The variable test’s findings are shown in Table 3. All of the study’s indicators, as shown in the table, have a value of 0.7, meaning that they are statistically valid and suitable for inclusion in research frameworks (Hair et al., 2021). Following the confirmation of the indicator’s validity, Table 3 displays the research model and the outer loading data. Cronbach’s alpha was then calculated to evaluate the consistency of the constructions. Henseler, Hubona, and Ray (2016) indicate that all nine components in our model have Cronbach’s alpha

values exceeding 0.70, with the lowest value for this construct being 0.861 (Table 3). This suggests a high level of dependability for the concept.

Additionally, for every construct, the composite reliability coefficient exceeds 0.70, and the average variance extracted (AVE) surpasses 0.50, demonstrating robust convergent validity (Hair et al., 2021). To evaluate discriminant validity, the square roots of AVE must exceed the correlation coefficients between the constructs. According to the Fornell and Lacker Criterion, Table 4 shows that each idea in our analysis has a second root of AVE that is bigger than the correlation coefficient values, suggesting excellent discriminant validity. Next, the discriminant validity is evaluated using HTMT analysis. According to Henseler et al. (2016), the discriminant test findings match the requirements if the value is less than 1. Table 5 indicates that the value does not exceed this number, indicating the validity of the model.

4.2. Assessment of structural fit of the model

The structural model’s results, demonstrate how well the model matches, as indicated by the residual value and model fit indices in Table 6.

The estimated model, which represents a more limited form of the fit measure, follows a total effect scheme and includes the model structure, whereas the saturated model evaluates correlations between all components. There is currently a paucity of advice in the PLS-SEM literature about the use of fit criteria, particularly when choosing between the

Table 3
Findings of measurement model.

Variable	Code	VIF	Outer Loading	Cronbach Alpha	Composite Reliability	AVE
IMB Adoption	IMB 1	2.656	0.910	0.900	0.937	0.833
	IMB 2	2.744	0.905			
	IMB 3	3.093	0.924			
Firm Reputation	FR 1	2.638	0.906	0.896	0.935	0.828
	FR 2	2.683	0.906			
	FR 3	2.875	0.918			
Innovation	INN 1	2.229	0.778	0.761	0.852	0.658
	INN 2	2.352	0.816			
	INN 3	1.239	0.838			
DBE	DBE 1	1.865	0.813	0.904	0.933	0.778
	DBE 2	3.299	0.899			
	DBE 3	4.291	0.926			
	DBE 4	2.906	0.887			
Perceived Ease of Use	PE 1	1.673	0.720	0.870	0.903	0.608
	PE 2	2.213	0.800			
	PE 3	2.523	0.831			
	PE 4	1.791	0.745			
	PE 5	1.747	0.749			
	PE 6	2.145	0.824			
	PE 7	2.213	0.800			
	PU 1	2.843	0.811			
	PU 2	2.918	0.848			
	PU 3	3.308	0.847			
Perceived Usefulness	PU 4	2.334	0.797	0.931	0.943	0.647
	PU 5	1.851	0.729			
	PU 6	1.871	0.727			
	PU 7	2.776	0.830			
	PU 8	2.864	0.825			
	PU 9	2.837	0.817			
Perceived Risk	PR 1	2.206	0.906	0.868	0.909	0.716
	PR 2	2.425	0.906			
	PR 3	2.497	0.918			
Perceived Security	PSC 1	3.498	0.930	0.932	0.956	0.880
	PSC 2	4.970	0.954			
	PSC 3	3.751	0.930			
Sharia Compliance	SC 1	3.343	0.947	0.909	0.942	0.844
	SC 2	3.004	0.898			
	SC 3	2.853	0.911			
Moderating	Customers Behavior x DBE (Moderating Effect)	1.000	1.000			

Table 4
Fornell and Lacker criterion for discriminant validity.

	DBE	Firm Reputation	IMB Adoption	Innovation	Perceived Ease of Use	Perceived Risk	Perceived Security	Perceived Usefulness	Shariah Compliance
DBE	0.882								
Firm Reputation	0.657	0.910							
IMB Adoption	0.853	0.607	0.913						
Innovation	0.568	0.558	0.498	0.811					
Perceived Ease of Use	0.574	0.553	0.548	0.425	0.780				
Perceived Risk	0.591	0.563	0.546	0.555	0.498	0.846			
Perceived Security	0.380	0.458	0.328	0.379	0.452	0.550	0.938		
Perceived Usefulness	0.666	0.653	0.634	0.503	0.766	0.553	0.514	0.804	
Shariah Compliance	0.053	0.039	0.036	-0.123	-0.004	-0.150	-0.154	0.066	0.919

Table 5
HTMT analysis for discriminant validity.

	DBE	Firm Reputation	IMB Adoption	Innovation	Perceived Ease of Use	Perceived Risk	Perceived Security	Perceived Usefulness
Firm Reputation	0.730							
IMB Adoption	0.645	0.675						
Innovation	0.627	0.615	0.541					
Perceived Ease of Use	0.645	0.625	0.616	0.476				
Perceived Risk	0.655	0.623	0.601	0.640	0.563			
Perceived Security	0.414	0.500	0.357	0.423	0.500	0.614		
Perceived Usefulness	0.725	0.714	0.691	0.541	0.846	0.605	0.553	
Shariah Compliance	0.056	0.042	0.037	0.171	0.063	0.169	0.160	0.072

Table 6
Model fit for discriminant validity.

Measure	Saturated Model	Estimated Model
SRMR (Standardized Root Mean Square Error)	0.052	0.056
Chi-Square	4124.149	4171.003
NFI (Normed Fit Index)	0.855	0.853

saturated and estimated models. However, the estimated model is a viable option to choose report fit findings for the PLS path model, even though there is some ambiguity in this selection (Ringle, Sarstedt, Sinkovics, & Sinkovics, 2023). This approach can provide a discriminant validity model fit perspective. This approach was employed and stated in the earlier study conducted by Kumar, Dhingra, Batra, and Purohit (2020), who also employed and discussed this technique. The Standardized Root Mean Square Residual (SRMR) measures the difference between the predicted correlation matrix of the model and the actual correlation. It provides a discussion to evaluate the average difference between the correlations that are seen and those that are anticipated, acting as an absolute indicator of model fit. Sufficient appropriateness is shown by SRMR values less than 0.10 (Theo K. Dijkstra, 2010). According to the test findings, the SRMR result value fits below 0.10, precisely at 0.052.

The model's overall fit was evaluated using chi-square values and tests comparing the sample covariance matrix with the model's covariance matrix. A straightforward comparison between chi-square and degrees of freedom is offered. It is considered suggestive of adequate model suitability when the CMIN/df value is five or below (Hair et al., 2021). This is consistent with the findings of the model test, which show an average value of 4. One less of the suggested model's Chi² value divided by the null model's Chi² value is the NFI. With a particular value of 0.855, the NFI result, which spans from 0 to 1, shows a stronger fit and suggests that the model is in good alignment with the study findings (Hair et al., 2021). The test results in Table 6 validate the appropriateness of the measuring tool by showing that the model for

each idea inside each latent variable is different from the other variables.

In the nine associations as described in Table 7 for specifics, the route coefficients are statistically significant. The researchers employed the Stone Geisser (Q²) model to predict predictive relevance in their testing. Only endogenous latent variables were included in this model. Regarding the PLS path model prediction, the Q² value is considered

Table 7
Path coefficients.

Relationship	Hypothesis	Original Sample (β)	T Statistics (O/STDEV)	P Values	Decision
DBE -> IMB Adoption	H1	0.753	60.103	0.000*	Supported
Moderating Effect Customer Behavior -> IMB Adoption	H1a	0.849	3.155	0.002	Supported
Perceived Usefulness -> DBE	H2	0.242	4.702	0.000*	Supported
Perceived Ease of Use -> DBE	H3	0.084	1.923	0.055	Supported
Perceived Security -> Perceived Ease of Use	H4	0.452	14.440	0.000*	Supported
Innovation -> DBE	H5	0.180	5.548	0.000*	Supported
Firm Reputation -> DBE	H6	0.242	5.853	0.000*	Supported
Perceived Risk -> DBE	H7	0.192	5.229	0.000*	Supported
Sharia Compliance -> DBE	H8	0.079	2.835	0.005	Supported

*, * means significant at 10 %, 5 % and 1 % level of significance respectively.

minor if it is greater than 0.02, moderate at 0.15, and severe at 0.35 (Zhao & Bacao, 2021)The Q² value for the intention to use Islamic m-banking is 0.57. This study’s findings demonstrate a model with substantial predictive value for the endogenous construct.

4.3. Hypothesis testing

The study’s hypothesis results are determined by looking at t-statistics and p-values from actual testing. This is further confirmed using bootstrapping calculations as described in Table 7. Normalcy testing makes use of bootstrapping, determining the degree of significance between latent variables without having to use a set minimum quantity of data (Sarstedt et al., 2022). The t-statistics value measures the influence of the independent variable on the dependent variable. It is considered significant when the t-statistics value exceeds the critical value from the t-table (1.97). Moreover, the hypothesis is confirmed if the p-values are below 0.05.

The partial results from the PLS-SEM analysis reveal a strong correlation between variables of TOE and the DBE. All the tested hypotheses received substantial support. Specifically, Hypothesis 1 indicates a significant positive relationship between DBE and IMB adoption, with a high coefficient estimate of 0.753, a significant T-statistic of 60.103, and a p-value of 0.000. Moreover, several factors, including perceived usefulness (H2, β = 0.242, p = 0.000), perceived ease of use (H3, β = 0.084, p = 0.055), innovation (H5, β = 0.180, p = 0.000), firm reputation (H6, β = 0.242, p = 0.000), perceived risk (H7, β = 0.192, p = 0.000), and Sharia compliance (H8, β = 0.079, p = 0.005), exhibit a strong positive relationship with the desire to use DBE, as indicated by their significant p-values, T-statistics, and coefficient estimates. Additionally, Hypothesis 4 (H4, β = 452, p = 0.000) shows that perceived security positively affects perceived ease of use. These insights are crucial for organizations aiming to enhance user adoption behavior, as they underscore the importance of various factors like perceived usefulness, perceived ease of use, innovation, firm reputation, perceived security, Sharia compliance, and perceived risk in influencing the decision to adopt DBE for a product or service.

4.4. Hypothesis testing of moderate role

To demonstrate the significant role of customer behavior in enhancing IMB adoption as a moderating factor, the author will present the model’s R-Square outcomes that include customer behavior as a moderating variable in the following section. If the R-Square value decreases when customer behavior is excluded, it indicates that customer behavior positively impacts bank performance. The subsequent analysis will focus on endogenous variables’ coefficient of determination (R²), which ranges from 0 to 1. In social sciences, R² values of 0.75, 0.50, and 0.25 are typically interpreted as substantial, moderate, and low, respectively (Hair et al., 2021). A value close to one suggests that the independent variable can nearly fully predict the dependent variable. In Table 8, the R-Square value for IMB Adoption is 0.728 without customer behavior and 0.734 with customer behavior included as a moderating variable, indicating a moderate level of prediction.

4.5. Hypothesis testing of mediating role

The involvement of a third variable that serves as an intermediary

Table 8
R-Square.

	R-square without Customer Behavior		R-square with Customer Behavior	
	R-square	R-square adjusted	R-square	R-square adjusted
DBE	0.588	0.585	0.588	0.585
IMB Adoption	0.728	0.727	0.734	0.733

between the independent and dependent variables is a key characteristic of a mediating effect (Kock, 2015). When formulating mediation hypotheses, researchers examine how an independent variable influences a dependent variable through this mediating variable. In the context of using PLS methods, understanding partial mediation is crucial for evaluating model fit. Since partial mediation frequently occurs in mediation analysis, exploring the mediated effect is particularly valuable. One way to assess this is by calculating the ratio of the indirect effect to the total effect, known as the Variance Accounted For (VAF) value (Sarstedt et al., 2020) (Eq. 1). VAF measures the proportion of the variance in the dependent variable that is explained by the mediation process (Hair, Anderson, Tatham, & Black, 2019). The formula for VAF is as follows:

Variance Accounted for Formula

$$VAF = \frac{a \times b}{(a \times b) + c} \tag{1}$$

According to established guidelines, a VAF below 20 % indicates minimal mediation, a VAF between 20 % and 80 % signifies partial mediation, and a VAF above 80 % indicates full mediation (Hair, Hult, Ringle, & Sarstedt, 2017). This study investigates how DBE mediates the relationship between TOE (Technology, Organization, and Environment) variables and IMB adoption, as depicted in Table 9 and Fig. 1. Specifically, Hypothesis H2a examines the relationship between Organizational Perceived Usefulness (PU), DBE, and IMB adoption, showing a direct effect value of 0.187, indicating a positive impact of PU on IMB. Additionally, the study identifies indirect effects of various factors mediated by DBE: Perceived Ease of Use at 0.064, Perceived Security at 0.029, Innovation at 0.139, Firm Reputation at 0.186, Perceived Risk at 0.148, and Sharia Compliance at 0.061. The total effect values for these factors are 0.187 for PU, 0.064 for PE, 0.029 for PSC, 0.139 for INN, 0.186 for FR, 0.148 for PR, and 0.061 for SC. With the VAF for all mediating hypotheses (H2a, H3a, H4a, H5a, H6a, H7a, H8a) being 100 %, this indicates full mediation. In simpler terms, this means that an increase in DBE is entirely associated with an increase in the adoption of IMB.

5. Discussion

This research seeks to explore how different elements of the TOE framework affect the DBE to foster greater adoption of IMB. For RQ1, the results demonstrate that each dimension of the TOE framework exerts a statistically significant and positive influence on the DBE. Moreover, the study shows that the DBE functions as a fully significant mediating variable, accounting for 100 % of the connection between the TOE framework dimensions and IMB adoption, thus answering RQ3.

The impact of the various dimensions within the TOE framework on the DBE and IMB adoption follows a clear, consistent pattern, with each dimension playing a crucial role. Perceived Usefulness has the strongest influence on the DBE, as users’ belief that the technology improves their banking experience significantly enhances their engagement with the DBE, which mediates the effect of Perceived Usefulness on IMB adoption. This aligns with prior studies that highlight the importance of Perceived Usefulness in driving both DBE effectiveness and IMB adoption (Alnemer, 2022; Johnen et al., 2023; Sasidharan & Venkatakishnan, 2024). Firm Reputation follows closely, as a positive reputation strengthens trust and reliability within the DBE, which mediates its positive impact on IMB adoption. This is consistent with research showing the critical role of trust and reputation in customer decision-making within the financial services sector (Sebayang et al., 2024a).

The third most impactful factor is Perceived Risk, which also positively affects DBE and is mediated through effective risk management within the ecosystem. This mitigates user concerns about security, facilitating smoother IMB adoption (Candiwan & Rianda, 2024; Qatawneh et al., 2024). Innovation ranks fourth, as companies that

Table 9
Mediating Role.

Relationship	Hypothesis	Direct Effect	Indirect Effect	Total effect	VAF	Result
Perceived Usefulness -> DBE -> IMB Adoption	H2a	0.187	0.187	0.187	100 %	Full Mediation
Perceived Ease of Use -> DBE -> IMB Adoption	H3a	0.064	0.064	0.064	100 %	Full Mediation
Perceived Security -> Perceived Ease of Use -> DBE	H4a	0.037	0.029	0.029	100 %	Full Mediation
Innovation -> DBE -> IMB Adoption	H5a	0.138	0.139	0.139	100 %	Full Mediation
Firm Reputation -> DBE -> IMB Adoption	H6a	0.186	0.186	0.186	100 %	Full Mediation
Perceived Risk -> DBE -> IMB Adoption	H7a	0.147	0.148	0.148	100 %	Full Mediation
Shariah Compliance -> DBE -> IMB Adoption	H8a	0.061	0.061	0.061	100 %	Full Mediation

demonstrate a willingness to adopt new technologies foster a dynamic DBE, enhancing IMB adoption (Fahad & Shahid, 2022; Shaw et al., 2022). Perceived Ease of Use follows in fifth place, as users' perception of the system's simplicity and user-friendliness positively influences their interaction with the DBE, thereby promoting IMB adoption (Alnemer, 2022; Johnen et al., 2023; Sasidharan & Venkatakrisnan, 2024).

Sharia Compliance, which ranks sixth, plays a vital role in Islamic banking. The DBE mediates its impact by ensuring that services comply with Sharia principles, boosting users' trust and engagement with IMB (Fidhayanti et al., 2024; Usman et al., 2022). Lastly, Perceived Security positively influences DBE through the mediation of Perceived Ease of Use, as users feel more confident using secure and reliable systems, which enhances their adoption of IMB (Candiwan & Rianda, 2024; Qatawneh et al., 2024).

In response to RQ2, this study confirms that the DBE exerts a significant and positive influence on IMB adoption, a finding that is consistent with prior research (Gezahegn et al., 2024; Zaato et al., 2023). This suggests that improving and enhancing the DBE can lead to higher rates of IMB adoption, ultimately contributing to better overall bank performance. By fostering a robust DBE, banks can create a more integrated and user-friendly digital platform that encourages greater consumer engagement with IMB services.

Moreover, the study provides further insight by addressing RQ4. The findings reveal that the impact of the DBE on IMB adoption is significantly amplified when moderated by Customer Behavior. To elaborate on how customer behavior impacts the DBE in the context of IMB adoption based on Table 9, the analysis demonstrates that customer behavior plays a moderating role in this relationship. The R-Square value for IMB Adoption increases from 0.728 (without customer behavior) to 0.734 (with customer behavior), indicating that incorporating customer behavior enhances the model's explanatory power. This suggests that customer behavior acts as a catalyst within the DBE, influencing how effectively the ecosystem supports IMB adoption. The slight increase in the R-Square value signifies that while the DBE itself holds significant predictive power, the true potential of IMB adoption is better realized when customer behavior is integrated into the model. The DBE's effectiveness is intertwined with customer traits, shaping how users perceive, interact with, and trust IMB services. This analysis underscores the importance of understanding customer diversity to maximize the DBE's impact and support IMB adoption. Banks and stakeholders should therefore not only focus on strengthening the DBE but also tailor strategies to align with different customer behavior types, ensuring various segments are effectively supported throughout the adoption journey. This result aligns with earlier studies, which emphasize the importance of understanding customer behavior in the context of digital banking adoption (P. Kumar et al., 2024; Sasidharan & Venkatakrisnan, 2024).

5.1. Theoretical implications

This research makes significant theoretical contributions across several critical areas. First, it deepens the understanding of how the DBE enhances IMB adoption, which in turn has a direct impact on company performance. This finding aligns with and extends the work of

Fernández-Portillo et al. (2024), emphasizing the strategic importance of a robust DBE in digital banking contexts. The study further reveals that the role of DBE in fostering IMB adoption is notably strengthened when customer behavior is taken into account as a moderating factor. This highlights the necessity of considering customer-centric factors when evaluating the effectiveness of digital ecosystems in banking.

Secondly, the research provides clarity on the substantial and positive effects of the TOE framework dimensions on DBE. Specifically, it confirms that Perceived Usefulness, Firm Reputation, Perceived Risk, Innovation, Perceived Ease of Use, Sharia Compliance, and Perceived Security are all critical components that significantly influence the strength and effectiveness of the DBE. By systematically analyzing these dimensions, the study contributes to a more comprehensive understanding of the mechanisms through which these factors contribute to the development and success of digital ecosystems in the banking sector.

Furthermore, the study identifies DBE as a vital mediator between TOE dimensions and IMB adoption, consistently underscoring its positive and significant mediating role across all dimensions examined. This finding is particularly important as it highlights the DBE's function in amplifying the beneficial impacts of favorable TOE conditions on IMB adoption. The study thus offers detailed insights into the mechanisms at play, demonstrating how a well-structured DBE can leverage these dimensions to optimize adoption outcomes and drive performance in the digital banking landscape.

Thirdly, this research introduces new perspectives by emphasizing the importance of analyzing DBE effectiveness from the customer's viewpoint. This customer-centric approach not only enriches the theoretical discourse on DBE but also provides practical guidance for companies seeking to strategically manage their digital ecosystems. By focusing on customer expectations and behaviors, companies can better align their digital products and services with market demands, thereby enhancing their competitive advantage. This insight builds on the work of Abdurrahman, Gustomo, and Prasetyo (2024), Barykin et al. (2020), and Senyo et al. (2019), and adds to the growing body of literature that advocates for a more nuanced and customer-oriented approach to digital ecosystem management.

5.2. Practical implications

This study offers actionable insights for professionals and policy-makers in the banking industry, providing a roadmap for enhancing DBE effectiveness and boosting IMB adoption. For banking professionals, the research underscores the importance of targeted investments in DBE to not only increase IMB adoption but also to improve overall bank performance. Practical strategies include prioritizing enhancements in Perceived Usefulness, managing Firm Reputation carefully, and mitigating Perceived Risk. These elements are pivotal in optimizing the impact of DBE initiatives and should be at the forefront of strategic planning.

Allocating resources efficiently can be achieved by following the prioritized order of TOE framework dimensions identified in the study. For example, focusing on enhancing Perceived Usefulness and Firm Reputation can yield significant improvements in DBE effectiveness. This strategic allocation ensures that efforts are concentrated on the most impactful areas, leading to more substantial gains in IMB adoption

and customer satisfaction.

The results emphasize the important role of customer behavior as a moderating variable between the DBE and IMB adoption, providing practical implications for banks. To enhance the adoption of IMB, businesses must understand and leverage customer behavior, as it significantly amplifies the impact of the DBE on digital banking adoption. Specifically, banks should focus on improving the customer experience by making IMB services easy to use and highly useful, to drive increased user satisfaction and long-term adoption. Additionally, addressing customer concerns through regular feedback on security, reliability, and usability can help reduce perceived risks and increase customer confidence in adopting and continuing to use IMB services. Targeted marketing strategies should align with specific customer behaviors, emphasizing the ease of use, usefulness, and Sharia compliance features of IMB to attract and engage users. By offering educational resources, integrating helpful tools, and ensuring clear communication of Sharia compliance, banks can foster greater customer trust and satisfaction.

For policymakers, the study provides a foundation for developing regulations that encourage innovation while building customer trust in digital banking. This is particularly relevant in the context of addressing security and compliance concerns. For instance, focusing on Perceived Security and Sharia Compliance can help create a regulatory environment that supports sustainable growth in the digital banking sector. By ensuring that these critical areas are adequately addressed, policymakers can promote a secure and trustworthy digital banking ecosystem, which in turn encourages broader adoption and long-term success.

5.3. Limitations and future research directions

While this research offers valuable insights into the relationship between the DBE and IMB adoption within the TOE framework, it has certain limitations that open avenues for future investigation. One significant limitation is the study's emphasis on theoretical frameworks and dimensions, without extensive empirical validation across a wide range of banking contexts. The findings are primarily based on specific customer perceptions and behaviors within a particular region, which may limit the generalizability of the results. To address this, future research should aim to conduct broader empirical studies across diverse regions and banking sectors, considering variations in culture, customer behavior, and regulatory environments to validate and potentially refine the conclusions drawn here.

Another limitation is the study's reliance on self-reported data, particularly regarding perceptions of DBE and TOE dimensions, which introduces the potential for bias or subjective interpretation. Respondents' personal views and experiences may not accurately reflect the broader customer base, leading to potential skewing of the results. Future research could mitigate this limitation by incorporating more objective measures, such as actual usage data or transaction records, to complement self-reported data. Additionally, employing mixed-method approaches, such as combining quantitative surveys with qualitative interviews or focus groups, could help triangulate the findings and provide a richer, more comprehensive understanding of the relationships between DBE, TOE dimensions, and IMB adoption.

Moreover, the study may not fully account for emerging technological trends or advancements in digital banking. The digital landscape is rapidly evolving, with technologies like artificial intelligence (AI), blockchain, and partnerships with fintech companies increasingly influencing the banking sector. These innovations could significantly impact both the DBE and IMB adoption in ways not captured by the current study. Future research should explore the influence of these emerging technologies on DBE development and IMB adoption, potentially identifying new dimensions or modifying existing ones within the TOE framework. By investigating how these technologies interact with customer behavior and organizational capabilities, subsequent studies

could provide a forward-thinking perspective that better aligns with the evolving digital banking environment.

The study's findings may be constrained by scalability issues, as it was conducted within a specific geographical context in Indonesia. The unique technological, cultural, and regulatory environment in Indonesia might not fully capture the dynamics present in other regions or countries, particularly those at different stages of digital banking development or with varying levels of technological infrastructure. This raises questions about whether the findings would hold true in other settings, particularly in nations with more advanced digital ecosystems or more developed mobile banking infrastructures. Scalability plays a crucial role in understanding how the TOE framework dimensions interact and impact the DBE. As digital banking solutions like IMB expand, their effectiveness and adoption may be influenced by factors such as the ability of organizations to manage increased complexity or meet the evolving demands of customers across diverse markets. While the current study provides valuable insights, it may not fully account for the variations that emerge when scaling the technological, organizational, and environmental dimensions of the TOE framework in larger, more intricate ecosystems. Future research could explore how scalability affects the relationships between the TOE dimensions and the DBE, particularly in contexts where digital banking solutions are rapidly scaling. This could involve investigating how organizations manage the growth of technological features, how firm reputation and innovation evolve as the DBE expands, and how perceived risk and Sharia compliance play a role in larger, more varied environments. Additionally, studying how customer behaviors shift as the DBE scales, such as the impact of introducing more advanced features, expanding service offerings, or reaching new market segments, would provide a more comprehensive understanding of IMB adoption across different scales of operation.

A key limitation of this study is its focus on Indonesia as the sole cultural context, which may limit the generalizability of the findings to other countries or regions with different cultural, economic, or regulatory environments. The cross-cultural applicability of the TOE dimensions could significantly impact how they are perceived and applied in various contexts. For example, while factors such as perceived usefulness and ease of use are crucial in Indonesia, their significance may vary in other cultural settings where values and priorities differ. Similarly, the perception of sharia compliance and perceived risk could vary notably in predominantly Muslim countries compared to those with more diverse religious and cultural landscapes. This suggests that the influence of the DBE on IMB adoption might not be uniform across different cultural contexts. Future research should focus on exploring the cross-cultural relevance of the TOE dimensions, especially in terms of how cultural values and societal norms influence the adoption of digital banking technologies like IMB. Conducting comparative studies across diverse countries or regions, particularly those with varying cultural, religious, and technological environments, could offer a deeper understanding of how these factors interact with the TOE framework. For instance, investigating how perceived security, sharia compliance, or firm reputation are viewed in different regions could provide more detailed insights into their influence on DBE and IMB adoption. Moreover, qualitative research methods could be employed in future studies to gain a deeper understanding of customer behavior and how it moderates the relationship between DBE and IMB adoption. In-depth interviews or focus groups would allow for more nuanced insights into how customer behavior is shaped by cultural influences, which could then be incorporated into the TOE framework to enhance its applicability across different settings.

Additionally, while this study touches on the importance of Sharia compliance as a dimension within the TOE framework, it does not delve deeply into the broader regulatory and cultural contexts that may influence DBE and IMB adoption. Different regions and countries may have unique legal frameworks, cultural norms, and religious considerations that impact how digital banking services are perceived and

adopted. Future research should explore these contextual factors more comprehensively, examining how they shape the development of DBE and the adoption of IMB across various settings. By addressing these limitations through future research, a more robust and comprehensive understanding of the relationship between DBE and IMB adoption can be achieved.

6. Conclusions

A key indicator of a bank's success in digital transformation is the improvement in performance through the development of a business ecosystem, facilitated by digital banking services, including increased m-banking adoption. In the past decade, research on the DBE has made significant strides across various dimensions, theories, and industries. Most of this research has concentrated on DBE development from the organizational capabilities perspective, with relatively few studies examining it from the customer's perspective. At the same time, m-banking adoption has attracted considerable interest from researchers, who have analyzed it through various theoretical lenses and in different countries. However, there remains a gap in research exploring the connection between DBE and m-banking adoption, especially in Islamic banks, adding a new dimension to these aspects. This study contributes fresh academic perspectives on the relationship between DBE and IMB adoption using the TOE framework, which effectively captures the socio-technical dimensions influencing DBE and its impact on IMB adoption.

This research underscores the pivotal role of the DBE in fostering the adoption of IMB, particularly when customer behavior acts as a moderating factor within the TOE framework. This study confirms that each dimension of the TOE framework including Perceived Usefulness, Perceived Ease of Use, Firm Reputation, Innovation, Perceived Risk, and Sharia Compliance, exerts a positive and significant influence on the development and strength of the DBE. Specifically, Perceived Usefulness and Perceived Ease of Use are critical drivers, as they determine how customers perceive the value and simplicity of IMB services, making them more likely to adopt such technologies within the digital ecosystem. Firm Reputation and Innovation contribute significantly by enhancing trust and providing cutting-edge solutions that attract and retain customers in the digital banking environment. Perceived Risk and Sharia Compliance are equally essential, as they address concerns related to security and religious adherence, both of which are crucial in the context of Islamic banking. The study also identifies Perceived Security as a vital factor, which, while directly contributing to the DBE, does so more effectively when mediated through Perceived Ease of Use. This indicates that customers are more likely to feel secure using IMB when they find the platform easy to navigate and understand, reinforcing the importance of user-friendly design in digital banking services.

Moreover, the research highlights the DBE's significant and positive mediating role between the TOE framework dimensions and IMB adoption. This finding suggests that a well-developed DBE not only enhances the direct effects of TOE dimensions on IMB adoption but also amplifies the overall impact by creating a supportive and integrated digital environment. The study confirms that banks aiming to boost IMB adoption should focus on strengthening the DBE by leveraging these TOE dimensions, thus ensuring a more robust, secure, and user-centric digital banking experience for their customers.

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CRedit authorship contribution statement

Abdurrahman Abdurrahman: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software,

Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

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The data that has been used is confidential.

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