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Determinants of successful digital adoption: A Meta-Synthesis Analysis using The TOE Framework

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ABSTRACT

Background: Digitization and digitalization are two processes that organizations must undertake. This is a form of organizational management's response to increasingly sophisticated technological developments. However, organizations cannot simply digitize and stop there to combat disruption caused by technological developments. In line with the development of AI and increasing public enthusiasm for utilizing technology, organizations must undertake Digital Transformation. Many organizations simply stop at the digitalization process without being able to increase the use of digital technology in their business processes to maximize services. Organizations are unable to carry out digital transformation to maximize the benefits of technology use within the organization.
Method: By utilizing the TOE Framework, this study analyzed 85 selected articles using the Prisma protocol. The data analysis technique used bibliometric analysis with VOS viewer and content analysis to identify thematic codes found in the selected articles.
Results: There are 4 factors included in the technology component, 6 factors included in the organizational component and 2 factors included in the environmental component.
Conclusion: The results of this study explain that the success of digital transformation is not only determined by the technology adopted by the organization, but also the organization's ability to integrate technology with business strategy, organizational capabilities and changes that occur in the organization's external environment.

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INTRODUCTION

Technological advancements require organizations to make changes in how they manage their businesses. Organizations must transform all their data and information into digital form. This is known as digitization. Examples of digitization include organizational information displayed on websites, digitally stored product data, and digitally stored customer data (Liu et al., 2022; Ritter & Pedersen, 2020; Verhoef et al., 2021).

Organizations don't just stop at digitization, but continue with the digitalization process. This process involves leveraging information technology to manage business processes and the organization's digital data (Karpova et al., 2019). Digitalization is also known as a social technological process that utilizes digital products or systems to develop business models, or develop new service procedures (Holmström, 2022; Saarikko et al., 2020). The digitalization of an organization is characterized by the development of computer-based applications or systems used to support business processes. This aims to improve organizational services and gain competitive advantage (Warner & Wäger, 2019).

To maximize the benefits of digitalization for an organization, it needs to continuously implement changes. These changes aim to make iterative adjustments to achieve maximum organizational performance (Mergel et al., 2019). The process of change that is carried out continuously is called digital transformation.

Unlike digitization and digitalization, which are directly related to technology, digital transformation is not directly related to technology. Digital transformation places more emphasis on the attitudes and culture developed when technology is used (Holmström, 2022; Saarikko et al., 2020; Teichert, 2019). Digital transformation for organizations is not an option but a necessity. Digital transformation should be a mandatory activity at the strategic management level (Warner & Wäger, 2019). This is due to the very rapid development of technology such as the development of artificial intelligence, big data internet, blockchain, cloud computing, and IoT which causes business models to have to be adjusted (Kitsios & Kamariotou, 2021; Teng et al., 2022; Vial, 2019).

A wealth of literature has been published identifying various factors that determine the success of digital transformation for businesses and MSMEs. These factors include the use of digital technology, digital capability, leadership, dynamic capability, a culture of innovation, and the organization's readiness to continuously change (Verhoef et al., 2021). However, this abundance of research doesn't necessarily translate into success for business and MSME managers in implementing digital transformation. Global research finds that only 25% of organizations have already undergone digital transformation, 41% are in the process of undergoing digital transformation, and 34% are simply talking about digital transformation without actually doing anything (Kane et al., 2017). This is because digital transformation is not an instant process, but a process that is carried out continuously (Mergel et al., 2019). This means the process must be carried out continuously. This sustainability challenge is even more difficult for business organizations when the process is confronted with the innovation designs that the organization is currently developing (Rubio-Andrés & Abril, 2024).

Some theories that are usually used to measure the adoption of digital technology include the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of planned behavior (TPB), Unified Theory of Acceptance and Use of Technology (UTAUT), Diffusion of innovation (DOI) (Maragno et al., 2023), TOE Framework, and RBV (Ismail et al., 2014). For technology adoption in an organization, UTAUT, TAM, TPB, or TRA are not used. Technology adoption in an organization is usually analyzed using DOI Theory, TOE or RBV. DOI Theory was initiated by Roger in 2003 (Maragno et al., 2023) which can help organizations to describe, predict and explain the stages in adopting technology (Holman & Perreault, 2023). RBV Theory does not actually specifically measure technology adoption in organizations. This theory measures organizational performance with resources and capabilities, where one of the resources is technology (Ismail et al., 2014). TOE is also a framework that is usually used to describe the behavioral intention of an organization so that it can ensure the impact of technology implementation gradually (Huang et al., 2022).

The TOE Framework is widely used to explain the phenomenon of digital transformation. This framework was first proposed by Tornatzky & Fleischer in 1990 (Maragno et al., 2023). The TOE Framework groups aspects of digital transformation into technological, organizational, and environmental aspects (Kalaitzi & Tsolakis, 2022). This shows that the success of digital transformation

is not solely determined by one or two of the above aspects. The success of digital technology is determined by all three aspects within this framework.

Several studies related to digital transformation have analyzed the relationship between digital transformation and digital technology (Bican & Brem, 2020; Verhoef et al., 2021), capability (Ellström et al., 2022; Konopik et al., 2022), and leadership (Gimpel et al., 2018; Teichert, 2019), all of which are analyzed partially. Therefore, this study uses the TOE framework to simultaneously analyze the success factors of digital transformation from three perspectives. This research was conducted to answer the question of what factors determine the success of digital transformation in an organization.

This research can contribute both theoretically and practically. Theoretically, the results of this study can enrich the development of the TOE Framework in the context of the digital economy, and practically, it can serve as a strategic reference for managers and policymakers in designing a more focused and sustainable digital transformation roadmap.

Digital transformation (DT) is a long-term process for an organization to utilize digital technology in its operations. This long process begins with digitization, followed by digitalization, and then DT can be implemented (Kraus et al., 2022; Saarikko et al., 2020). Digitization is a technical process that converts analog signals into digital signals. Digitalization is a socio-technical process that utilizes digitized products or systems to develop new procedures or business models for the organization. DT is a socio-cultural process for adapting a company to new organizational forms and the new skills needed to remain sustainable and relevant in the digital landscape (Saarikko et al., 2020). Several researchers explain that DT is essentially a long-term process of using digital technology in every day-to-day organizational activity to build capabilities that can be used to renew strategies and develop business models.

Several studies with a qualitative approach found that to be able to digitally transform, organizations need dynamic capabilities (Dang-Pham et al., 2022; Ellström et al., 2022; Konopik et al., 2022). Organizations must be able to sense (Sensing), utilize (Seizing), and reconfigure (reconfiguring) so they can change business models and change strategies in their organizations. Other studies use 4 dimensions in measuring digital transformation, namely the use of digital technology, improving relationships, improving organizational operational processes, and changing business models (Guo & Xu, 2021). Teng (2022) uses 3 indicators to measure digital transformation, including Digital Transformation maturity, the use of digital technology, and how much the operational scope of the organization uses digital technology.

One theory commonly used to explore digital technology adoption is the TOE Framework (Ismail et al., 2014; Kalaitzi & Tsolakis, 2022; Maragno et al., 2023). TOE stands for Technology-Organization-Environment. This theory was first proposed by Tornatzky & Fleischer (1990). This theory aims to provide a comprehensive explanation of behavioral intentions at the organizational or company level (Nguyen et al., 2022). The TOE framework assesses the impact of technology implementation in stages, starting with the organization's need for technology, through its application to internal regulations (Huang et al., 2022), and ultimately, its impact on the organization's external environment.

Tornatzky divides the conditions influencing technology implementation into three aspects: Technology, Organization, and Environment (L. G. Tornatzky & Fleischer, 1990). The technology aspect refers to the technology adopted by an organization and related factors such as data, applications, and the outcomes of technology adoption (Yin, 2023). Technological infrastructure readiness, system integration, cybersecurity, and technological complexity are all critical factors in the success of digital transformation (Chen et al., 2021). Organizations with flexible and incrementally developed technology architectures tend to be more adaptable in integrating digital innovation. Furthermore, data analytics capability is a supporting factor in creating information-based competitive advantage (Mikalef et al., 2020).

Organizational refers to factors related to the internal organizational environment, such as organizational size (Malik et al., 2021), organizational complexity (Maragno et al., 2023), and dynamic capability, especially innovation capabilities (Qi et al., 2023). Furthermore, other factors such as top management support, strategic vision, an organizational culture that supports innovation, and employee digital competency also significantly influence the success of digital transformation (Li et al., 2018). Research findings indicate that digital transformation failure is often not caused by technological

limitations, but rather by internal resistance and a lack of alignment between business and digital strategies (Kraus et al., 2021).

Environment refers to factors influencing technology adoption originating from outside the organization, such as government regulations (Long Tuankechik et al., 2023; Malik et al., 2021), market competition mechanisms (Qi et al., 2023), and societal behavior (Maragno et al., 2023). Other factors influencing digital transformation in business organizations are digital ecosystem support and industry changes (Kraus et al., 2021). The rapidly changing external business environment encourages organizations to accelerate digital innovation to maintain market relevance.

METHOD

This study employed a systematic literature review (SLR) approach to identify and analyze research findings on the determinants of digital transformation success using the TOE Framework perspective. This approach was used because it allows for a systematic and transparent review of the entire literature, thereby minimizing the emergence of bias (Tranfield et al., 2003).

The SLR approach has a structured procedure for selecting and analyzing articles. This allows for a more comprehensive and methodologically sound synthesis. This study employed a methodology that integrates three main layers of analysis:

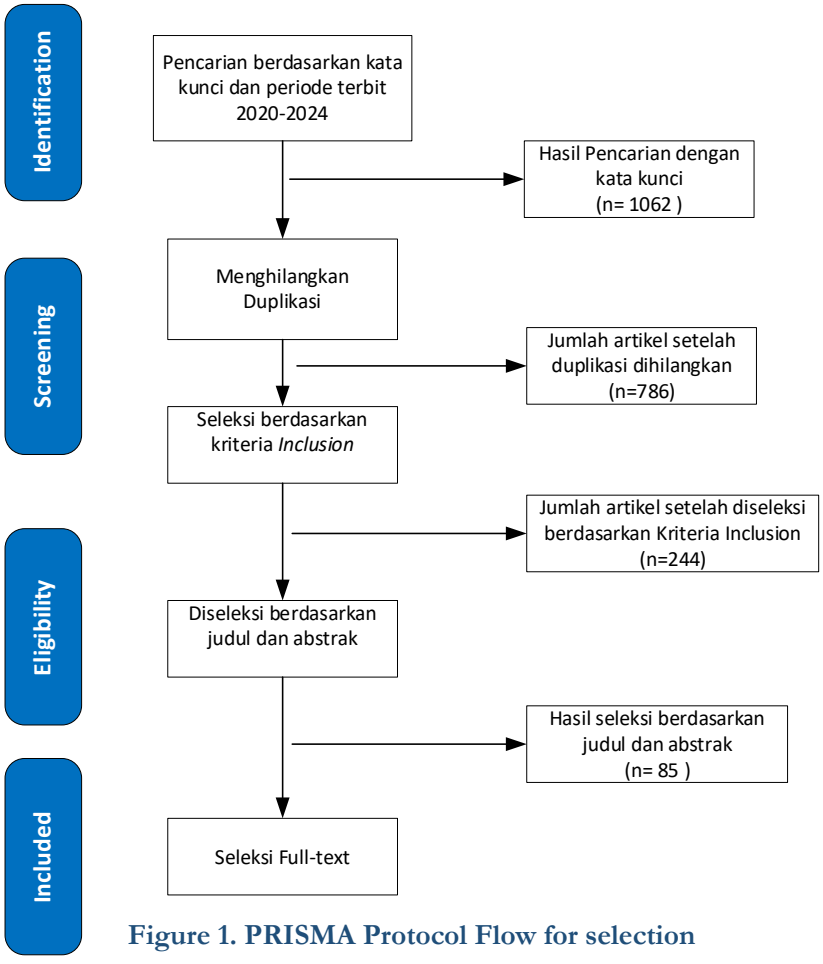

Figure 1. PRISMA Protocol Flow for selection

PRISMA Protocol for the Article Selection Process

PRISMA stands for Preferred Reporting Items for Systematic Reviews and Meta-Analysis. PRISMA is a reporting guideline for explaining the article selection process in SLRs. The PRISMA protocol ensures transparency in the selection process, avoids bias, and ensures research replicability (Page et al., 2021). The PRISMA framework is divided into four main stages: the identification stage, which is the initial stage for identifying articles. The next stage is the screening stage, which is the process of filtering articles based on the title and abstract. The third stage is the eligibility stage, which evaluates

eligibility through a full-text review. The final stage is the inclusion stage, which determines the final articles to be analyzed (Rethlefsen et al., 2021).

Figure 1 shows the PRISMA Flow Diagram for this study. In this study, the identification stage was conducted by searching for articles in the Google Scholar and Scopus databases using the keywords "Digital Transformation," "TOE Framework," "Organizational Performance," "Digital Capability," and "Digital Strategy" published between 2020 and 2024. The identification process identified 1,062 articles. However, 276 articles were duplicates, so these were removed, leaving 786 articles. These articles were then screened using the inclusion criteria of being peer-reviewed, discussing digital transformation at the organizational level, and linking digital transformation to the components of Technology, Organization, and Environment. Based on these criteria, 244 articles met the inclusion criteria and were analyzed.

These articles entered the third stage of selection, which assessed eligibility based on title and abstract. Of the 244 articles, 85 were selected for full-text analysis. These articles were then subjected to full-text analysis.

Bibliometric Analysis Using VOS Viewer

This study used bibliometric analysis based on VOS Viewer software to complement the systematic approach previously implemented (van Eck & Waltman, 2010). This analysis was conducted by completing each article's metadata in Mendeley software and then exporting it as a RIS. The exported file was imported into VOS Viewer software and analyzed, producing a network cluster visualization, facilitating the identification of research patterns. The results of the bibliometric analysis, depicted in the network cluster format, can be used to identify keywords for use in the TOE Framework coding. This analysis aims to map the intellectual structure and trends of digital transformation research for the 2020-2024 period.

Content Analysis

Before conducting content analysis, bibliometric results in the form of keywords in network clusters were used to code relevant data using the TOE Framework. Coding was divided into three contexts: technological context, organizational context, and environmental context. After determining the TOE Framework coding, articles were systematically analyzed using a deductive approach (Elo et al., 2014), where TOE categories were predetermined through the TOE Framework coding. This approach resulted in a theoretical contribution in the form of a systematic and comprehensive mapping of success factors for digital transformation (Assarroudi et al., 2018).

RESULTS AND DISCUSSION

Bibliometric Analysis

Bibliometric analysis was conducted on 85 articles that met the four-stage selection process using the PRISMA protocol. The bibliometric analysis was conducted using VOS Viewer software to map the conceptual structure and development of research themes related to digital transformation from the TOE Framework perspective. Figure 2 shows a visualization of the results of the bibliometric analysis using VOS Viewer. The bibliometric analysis results in Figure 2 show 41 items distributed into five clusters. The first cluster is green, the second is red, the third is blue, the fourth is yellow, and the fifth is purple.

The green cluster represents the digital transformation and organizational performance cluster. This cluster focuses on digital transformation and is linked to the keywords firm performance, financial performance, digitalization, digital innovation, digital leadership, sustainability, and value. This cluster indicates that the majority of research links digital transformation to value or value creation and improved organizational performance. The mapping results indicate that the current published literature still largely links digital transformation to organizational performance. The relationship between digital innovation and organizational performance implies that digital innovation is viewed as a crucial mechanism for creating competitive advantage.

The red cluster represents the TOE Framework cluster and the technology perspective. This cluster displays the keywords technology, TOE Framework, Top Management support, Cloud, e-commerce, and SMEs. This cluster represents the technology dimension and theoretical approach in the research.

One of the keywords in this cluster is TOE Framework, proving that the TOE model remains a widely used framework in explaining the adoption and implementation of digital transformation. Figure 2 shows that the keyword top management support has a strong relationship with the TOE Framework. This demonstrates that organizational factors, particularly top management support, are often integrated with TOE Framework-based analysis.

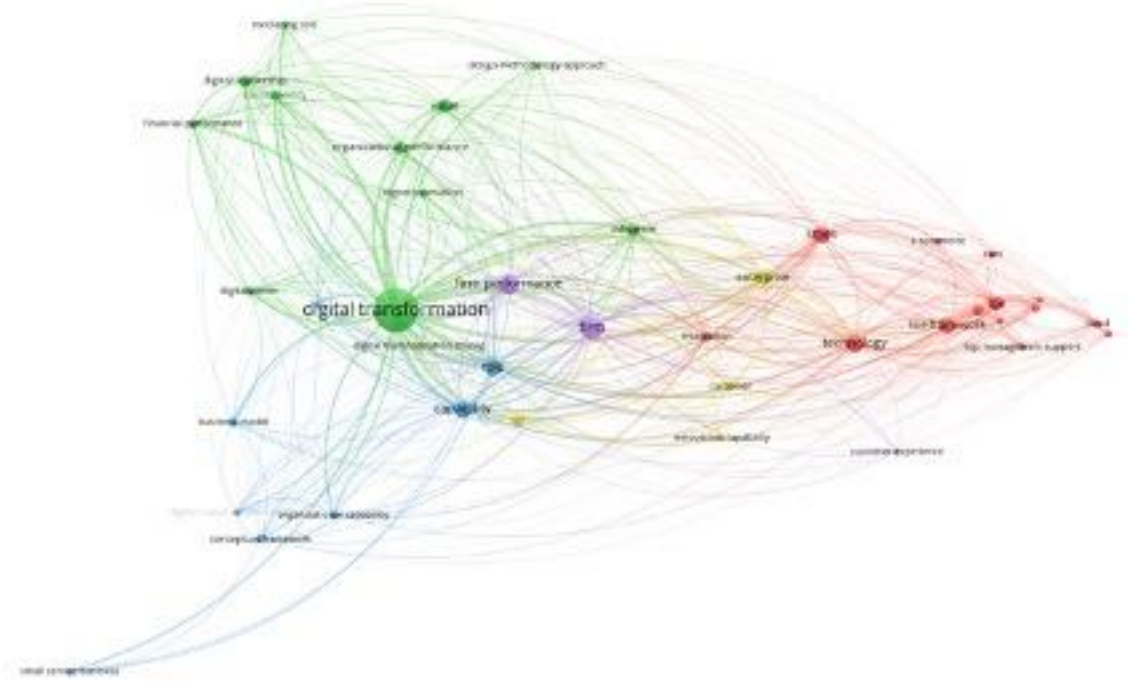

Figure 2. Visualization of Bibliometric Analysis with VOS Viewer software

The blue cluster represents the organizational capability and business model cluster. This cluster focuses on capability, organizational capability, and business model. This cluster emphasizes the importance of internal organizational capabilities in supporting the digital transformation process. Capability refers to an organization's ability to integrate resources, manage change, and adapt its business model. The relationship between the keywords "digital transformation" and "business model" indicates that digital transformation often impacts changes in an organization's business model.

The yellow and purple clusters represent the customer integration and experience clusters. These clusters contain the keywords "innovation," "innovation capability," "customer," "customer experience," and "enterprises." These clusters demonstrate that digital transformation is not solely oriented toward internal organizations but also toward system integration and improved customer experience. Figure 2 shows that all clusters are connected to each other. No single cluster stands alone. The relationship between the red cluster (technology) and the blue cluster (organization capability) demonstrates that many studies view digital transformation as the result of the interaction between technological readiness and organizational capabilities. On the other hand, the digital transformation cluster (green) is also related to the enterprises and customer experience clusters. This indicates the direction of the research.

From the TOE Framework perspective, these bibliometric results indicate that all keywords are distributed across three aspects of the TOE Framework. The technology aspect is reflected through the keywords "technology," "cloud," "e-commerce," and "digitalization." The organization aspect is reflected through the keywords "digital innovation," "digital leadership," "business model," "value," "innovation capability," "capability," "organizational capability," and "top-management support." The environment aspect is reflected through the keywords "customer experience," "customer," "enterprise," and "SME." The above description demonstrates that much digital transformation research links it to technology and organization. However, only a few studies analyze digital transformation from an environmental perspective.

Content Analysis

Content analysis in this study was conducted to identify key themes discussed in the literature on the determinants of successful digital transformation in an organization. This analysis was conducted by integrating the results of bibliometric analysis using VOS Viewer and followed by thematic coding of selected articles using the Prisma protocol. This approach was used to visualize and group the various concepts discussed in the articles into more systematic thematic categories.

Based on the visualized bibliometric analysis results, several clusters reflect three aspects of TOE. The most frequently appearing aspect in each cluster is the organizational aspect. This indicates that many studies view the success of digital transformation from an organizational perspective. Table 1 shows that three clusters-clusters 1, 3, and 4 contain several keywords relevant to the organizational aspect. The technology aspect appears in cluster 2, while the environment aspect appears in two clusters clusters 4 and 5.

The first cluster is dominated by the keywords digital transformation and innovation. This cluster indicates that many studies view digital transformation as a strategic process related to organizational innovation. This shows that digital transformation is not only about adopting new technologies but also as an organizational process in creating value and interacting with customers.

Table 1. Theme Distribution by VOSviewer Cluster

Cluster	Warna Visualisasi	Tema Dominan	Dimensi TOE	Interprestasi
Cluster 1	Hijau	Digital Transformasi dan Innovation	Organization	Berfokus pada Manajemen strategis
Cluster 2	Merah	TOE Framework & Perspektif teknologi	Technology	Berfokus pada adopsi teknologi
Cluster 3	Biru	Kapabilitas organisasi dan model bisnis	Organization	Berfokus pada kapabilitas dan strategi
Cluster 4	Kuning	Kapabilitas Inovasi	Organization	Berfokus pada strategi
		Enterprise	Environment	Berfokus pada pengelolaan organisasi
Cluster 5	Ungu	Customer Experience	Environment	Berfokus pada customer

The second cluster relates to technological aspects that support digital transformation. This cluster demonstrates that most research emphasizes that technology is a strong foundation for implementing an organization's digital strategy. Technological infrastructure enables organizations to integrate information systems, manage data, and improve operational efficiency through business process automation.

The third cluster relates to organizational capabilities and business models. This cluster demonstrates that much of the literature demonstrates that digital transformation is not simply about having a digital technology infrastructure. Organizations also need to develop their capabilities to utilize digital technology as effectively as possible. Furthermore, this technology utilization also needs to be supported by the development of relevant business models to maximize organizational performance.

The fourth cluster is dominated by the themes of innovation and enterprise capabilities. This cluster demonstrates that the literature links digital transformation with innovation and enterprise capabilities. The enterprise represents the organization as a whole. This demonstrates that all aspects of the organization must be prepared to support digital transformation. Innovation capabilities are essential for organizations to successfully implement digital transformation.

The final cluster is dominated by the theme of customer experience. Much of the literature links digital transformation with customer experience. In this case, customer experience is a result of digital transformation. Customer experience is not the determinant of digital transformation success, but rather the impact of digital transformation undertaken by an organization.

Based on the thematic coding process for the 85 selected articles, numerous concepts emerged from the analyzed articles. These concepts were then grouped into main themes representing each factor in digital transformation success. Table 2 shows the results of the content analysis. Table 2 shows six main themes consisting of 12 subthemes.

Digitalization

The first theme relates to digitalization. The success factors included in this theme are social media and e-commerce. Fifty-four percent of the literature mentions that one of the keys to successful digital transformation is utilizing social media. In the TOE Framework, social media is part of the Technology Context. The literature shows that digital transformation begins with digitalization in a very simple form, namely utilizing social media (Teng et al., 2022; Van Veldhoven & Vanthienen, 2022) in an organization's business processes. The use of social media in business processes includes introducing brands to the wider public, providing product and service information (Karekla et al., 2021), or obtaining feedback from the organization's target market (Fachrunnisa et al., 2020). The use of social media is clear evidence that an organization has begun digitizing its management.

At the next level, digitalization is carried out by utilizing e-commerce to distribute the organization's products. E-commerce is part of the technology context in the TOE Framework. 26% of the literature mentions that e-commerce is a factor in organizational success in carrying out digital transformation. The implementation of e-commerce allows organizations to increase efficiency in the sales and product distribution process (Agustian et al., 2023; Chen et al., 2021; Matarazzo et al., 2021). E-commerce platforms can help organizations reach customers in different geographic locations. This allows organizations to expand markets and increase the accessibility of products and services for customers (Pereira et al., 2022). E-commerce is not only used to distribute products, but organizations can also use e-commerce data to identify customer behavior (Castagna et al., 2020; Van Veldhoven & Vanthienen, 2022).

Technology

The second theme relates to technological infrastructure. This theme explains several success factors for digital transformation, which are part of the technology context, namely blockchain and cloud computing. Blockchain is a technology that enables decentralized data storage and exchange through a secure and transparent Digital Ledger System (Ghosh et al., 2022; Zhai et al., 2022). This technology is used to increase trust and transparency in data transactions or digital processes. Twenty-seven percent of the literature reports that implementing blockchain in business processes is crucial for increasing efficiency. Blockchain has the potential to improve the efficiency and security of organizational activities such as supply chain management, financial transactions, and digital identity management. Blockchain is a crucial factor in the success of digital transformation (Teng et al., 2022). This is evidenced by blockchain's ability to provide a secure and distributed system that enables organizations to develop more innovative and reliable business models (Pereira et al., 2022; Tratkowska, 2020).

In addition to using blockchain technology, organizations can leverage cloud computing in their digital transformation efforts. Cloud computing, also part of the technology context in the TOE framework, is a technology that enables organizations to increase flexibility and efficiency in managing their technology infrastructure (Fernández-Rovira et al., 2021; Zhai et al., 2022). Cloud computing provides access to digital resources such as data storage and software over the internet. Organizations utilize cloud computing to support the implementation of other technologies such as big data analysis, AI, and CRM. Forty percent of the literature cites cloud computing implementation as a key factor in the success of digital transformation. Utilizing cloud computing allows organizations to increase system capacity according to their needs (Konopik et al., 2022; Mahmood, Khakwani, et al., 2024). Furthermore, organizations can integrate various applications that support business processes with cloud computing mechanisms (Chen et al., 2021; Tsou & Chen, 2023). This proves that cloud computing is a crucial foundation that enables organizations to develop a more integrated digital ecosystem.

Table 2. Content Analysis Results

Domensi TOE	Tema Utama	Sub Tema	jml	%	Artikel
Technology	Digitalization	Social media	46	54	(Agustian et al., 2023; Ahmad et al., 2021; Alamäki & Korpela, 2021; Aly, 2022; Bican & Brem, 2020; Caliskan et al., 2021; Castagna et al., 2020; Chen et al., 2021; Cichosz et al., 2020; Diao, 2024; Fachrunnisa et al., 2020; Fernández-Rovira et al., 2021; Ghosh et al., 2022; Gil-Gomez et al., 2020; Guo & Xu, 2021; J. He & Su, 2022; Holmström, 2022; Karekla et al., 2021; Khakwani et al., 2024; Kitsios & Kamariotou, 2021; Konopik et al., 2022; Liu et al., 2022; Ma et al., 2022; Magistretti et al., 2021; Mahmood, Khakwani, et al., 2024; Masoud & Basahel, 2023; Matarazzo et al., 2021; Peng & Tao, 2022; Pereira et al., 2022; Peter et al., 2020; Rosero-Garcia & Montano-Salamanca, 2024; Saarikko et al., 2020; Salih et al., 2024; Scuotto et al., 2020; Senadjki et al., 2024; P. Smith & Beretta, 2021; Soto Setzke et al., 2023; Teng et al., 2022; Tijan et al., 2021; Tratkowska, 2020; Tsou & Chen, 2023; Van Veldhoven & Vanthienen, 2022; Yin, 2023; Yusuf et al., 2023; Zhai et al., 2022; Ziółkowska, 2021)
Technology		e-commerce	22	26	(Agustian et al., 2023; Castagna et al., 2020; Chen et al., 2021; Cichosz et al., 2020; Fachrunnisa et al., 2020; Fernández-Rovira et al., 2021; Ghosh et al., 2022; Gil-Gomez et al., 2020; Guo & Xu, 2021; Karekla et al., 2021; Liu et al., 2022; Masoud & Basahel, 2023; Matarazzo et al., 2021; Pereira et al., 2022; Peter et al., 2020; Pierre, 2023; Scuotto et al., 2020; van Tonder et al., 2020; Van Veldhoven & Vanthienen, 2022; Yusuf et al., 2023; Ziółkowska, 2021)
Technology	Teknologi	Blockchain	23	27	(Ahmad et al., 2021; Cichosz et al., 2020; Fernández-Rovira et al., 2021; Ghosh et al., 2022; Guo & Xu, 2021; Karekla et al., 2021; Khakwani et al., 2024; Kitsios & Kamariotou, 2021; Liu et al., 2022; Ma et al., 2022; Magistretti et al., 2019; Mahmood, Ditta, et al., 2024; Pereira et al., 2022; Rosero-Garcia & Montano-Salamanca, 2024; Salih et al., 2024; Teng et al., 2022; Tijan et al., 2021; Tratkowska, 2020; Tsou & Chen, 2023; Van Veldhoven &

					Vanthienen, 2022; Yin, 2023; Zhai et al., 2022; Ziółkowska, 2021)
Technology		Cloud Computing	34	40	(Agustian et al., 2023; Ahmad et al., 2021; Bican & Brem, 2020; Caliskan et al., 2021; Chen et al., 2021; Cichosz et al., 2020; Cuomo et al., 2021; Fachrunnisa et al., 2020; Fernández-Rovira et al., 2021; Ghosh et al., 2022; Guo & Xu, 2021; J. He & Su, 2022; Karekla et al., 2021; Khakwani et al., 2024; Kitsios & Kamariotou, 2021; Konopik et al., 2022; Liu et al., 2022; Mahmood, Khakwani, et al., 2024; Masoud & Basahel, 2023; Pereira et al., 2022; Peter et al., 2020; Rosero-Garcia & Montano-Salamanca, 2024; Saarikko et al., 2020; Salih et al., 2024; J. Smith, 2024; Soto Setzke et al., 2023; Teng et al., 2022; Tijan et al., 2021; Tratkowska, 2020; Tsou & Chen, 2023; van Tonder et al., 2020; Van Veldhoven & Vanthienen, 2022; Yin, 2023; Zhai et al., 2022)
Organisasi	Innovation	Digital Innovation	32	38	(Agustian et al., 2023; Ahmad et al., 2021; Aly, 2022; Bican & Brem, 2020; Caliskan et al., 2021; Chen et al., 2021; Cichosz et al., 2020; Correani et al., 2020; Fachrunnisa et al., 2020; Fernández-Rovira et al., 2021; Guo & Xu, 2021; J. He & Su, 2022; Holmström, 2022; Karekla et al., 2021; Khakwani et al., 2024; Kitsios & Kamariotou, 2021; Ma et al., 2022; Masoud & Basahel, 2023; Merín-Rodrigáñez et al., 2024; Mollah et al., 2024; Peng & Tao, 2022; Saarikko et al., 2020; J. Smith, 2024; Teng et al., 2022; Tijan et al., 2021; Tsou & Chen, 2023; Van Veldhoven & Vanthienen, 2022; Weber, 2024; Yin, 2023; Zhai et al., 2022; X. Zhao et al., 2024; Zheng & Bu, 2024)
Organisasi		Business model	19	22	(Agustian et al., 2023; Bican & Brem, 2020; Caliskan et al., 2021; Chen et al., 2021; Chwiłkowska-Kubala et al., 2023; Correani et al., 2020; Dash & Chakraborty, 2021; Diao, 2024; Gil-Gomez et al., 2020; Kitsios & Kamariotou, 2021; Matarazzo et al., 2021; Merín-Rodrigáñez et al., 2024; Peter et al., 2020; Prihandono et al., 2024; Rosero-Garcia & Montano-Salamanca, 2024; Tratkowska, 2020; van Tonder et al., 2020; Xu et al., 2024; F. Zhao et al., 2023)

Organisasi	Capability	Innovation Capability	32	38	(Agustian et al., 2023; Barba-Sánchez et al., 2024; Castagna et al., 2020; Cennamo et al., 2020; Cichosz et al., 2020; Fachrunnisa et al., 2020; Ghosh et al., 2022; Gil-Gomez et al., 2020; González-Varona et al., 2021; Guo & Xu, 2021; Konopik et al., 2022; Lanzolla et al., 2021; Liu et al., 2022; Magistretti et al., 2021; Mahmood, Khakwani, et al., 2024; Matarazzo et al., 2021; Merín-Rodrigáñez et al., 2024; Pierre, 2023; Puelles & De La Vega, 2024; Salih et al., 2024; Scuotto et al., 2020; J. Smith, 2024; P. Smith & Beretta, 2021; Soto Setzke et al., 2023; Teng et al., 2022; Tijan et al., 2021; Tsou & Chen, 2023; van Tonder et al., 2020; Weber, 2024; Yusuf et al., 2023; Zhai et al., 2022; X. Zhao et al., 2024; Zheng & Bu, 2024)
Organisasi		Organizational capability	16	19	(Alamäki & Korpela, 2021; Correani et al., 2020; Fachrunnisa et al., 2020; Ghosh et al., 2022; Gil-Gomez et al., 2020; González-Varona et al., 2021; Hsiao, 2024; Karadağ et al., 2024; Khakwani et al., 2024; Konopik et al., 2022; Masoud & Basahel, 2023; Matarazzo et al., 2021; Rawashdeh et al., 2024; Rosero-Garcia & Montano-Salamanca, 2024; Salih et al., 2024; Scuotto et al., 2020; Tijan et al., 2021)
Organisasi	Leadership	Digital Leadership	17	20	(Cichosz et al., 2020; Dinh Phuong Hoa et al., 2024; Fachrunnisa et al., 2020; Gun et al., 2024; Ho Dai & Huynh Tan, 2023; Karekla et al., 2021; Konopik et al., 2022; Lukito et al., 2023; Mahmood, Khakwani, et al., 2024; Marx et al., 2021; Matarazzo et al., 2021; Pereira et al., 2022; Peter et al., 2020; Radha & Aithal, 2024; Senadjki et al., 2024; van Tonder et al., 2020; Yusuf et al., 2023)
Organisasi		Top Management Support	15	18	(Ahmad et al., 2021; Alamäki & Korpela, 2021; Bican & Brem, 2020; Cheng & Wang, 2023; Dinh Phuong Hoa et al., 2024; Fernandez-Vidal et al., 2022; Gun et al., 2024; Z. He et al., 2023; Lukito et al., 2023; Matarazzo et al., 2021; Saarikko et al., 2020; D. Wang & Xia, 2024; R. Wang et al., 2023; Yin, 2023; Zhang et al., 2023)
Environment	Performance	Customer Experience	15	18	(Agustian et al., 2023; Ahmad et al., 2021; Alamäki & Korpela, 2021; Castagna et al., 2020; Gil-Gomez et al., 2020; Karekla et al., 2021; Khakwani et al., 2024; Masoud & Basahel, 2023;

					Matarazzo et al., 2021; Pereira et al., 2022; Pierre, 2023; P. Smith & Beretta, 2021; Tratkowska, 2020; Zhai et al., 2022; Ziółkowska, 2021)
Environment		Sustainability	11	13	(Agustian et al., 2023; Andriushchenko et al., 2020; Chen et al., 2021; Gil-Gomez et al., 2020; Gomez-Trujillo & Gonzalez-Perez, 2022; J. He & Su, 2022; Holmström, 2022; Konopik et al., 2022; Matarazzo et al., 2021; Pierre, 2023; Salih et al., 2024)

Innovation

Tema ketiga dalam content Analysis adalah inovasi (Innovation). Tema ini terdiri dari 2 faktor The key to successful digital transformation are digital innovation and business models. These two factors are part of the organizational context in the TOE Framework. Digital innovation is an organization's ability to develop innovations supported by digital technology (J. He & Su, 2022; Ma et al., 2022). Digital technologies such as the Internet of Things (IoT), big data analysis, and artificial intelligence enable organizations to explore various innovation opportunities. Thirty-eight percent of the literature explains that digital innovation is a critical factor for successful digital transformation. Organizations need to develop digital innovation as part of their digital transformation journey. By utilizing digital technology innovatively, organizations can create new solutions that improve service quality, accelerate business processes, and expand market reach through digital platforms (Matarazzo et al., 2021; Scuotto et al., 2020; Soto Setzke et al., 2023).

One of the impacts of digital innovation is the business model. When an organization implements digital innovation, the business model must be adjusted to support the innovation. One form of organizational innovation is the development of new business models as a form of adjustment to technological adaptation (Bican & Brem, 2020; Gil-Gomez et al., 2020). Digital transformation requires organizations to review previous business models and develop new ones that better suit the characteristics of the digital economy. Twenty-two percent of the literature states that business model adjustments must be made to support the technological infrastructure that the organization already has, so that organizational management can be carried out more effectively to improve organizational performance and customer experience (Agustian et al., 2023; Correani et al., 2020; Ghosh et al., 2022).

Capability

The fourth theme is capability. The critical success factors included in this theme are innovation capability and organizational capability. In the TOE framework, these two factors are part of the organizational context. Innovation capability is an organization's ability to create, develop, and implement new ideas related to products, services, business processes, and business models (Liu et al., 2022; Teng et al., 2022). Thirty-eight percent of the literature explains how innovation capability is crucial to the success of digital transformation. Digital transformation opens opportunities for organizations to develop innovations that can increase added value for customers. Therefore, organizations need to have innovation capability. Organizations with high innovation capability are better able to leverage digital technology to create more innovative solutions. Innovation capability enables organizations to adopt digital technology and use it as a means to create competitive advantage (Gil-Gomez et al., 2020; Masoud & Basahel, 2023; Scuotto et al., 2020).

Organizations must not only build innovation capability but also develop other capabilities. 19% of the literature states that organizations not only need innovation capability but also other capabilities that must be developed by the organization. Organizational capability refers to an organization's ability to manage the resources, processes, and competencies needed to support the implementation of digital transformation (Chen et al., 2021; Konopik et al., 2022). The capabilities that must be developed are dynamic capability, employee digital capability, strategic leadership and change management, and agility capability. These capabilities must be developed by organizations to support the utilization of their existing technological infrastructure (Ghosh et al., 2022; J. He & Su, 2022; Karadağ et al., 2024). Without capabilities, an organization's technology cannot be utilized effectively for the benefit of the

organization. Organizations with a high level of flexibility and good internal coordination have a greater chance of successfully implementing digital transformation. This means that organizational capability serves as a foundation that enables organizations to integrate digital technology into their operational and strategic activities (Liu et al., 2022; Teng et al., 2022). This capability is important for organizations to build for successful digital transformation.

Leadership

The fifth theme is leadership. This theme represents two factors that drive the success of digital transformation: digital leadership and top management support. In the TOE Framework, these two factors are part of the organizational context. Digital leadership relates to a leader's technical ability to understand technology and strategic ability to manage organizational change (Lukito et al., 2023; Senadjki et al., 2024). Twenty percent of the literature explains that digital leadership is crucial in determining the success of digital transformation. Digital transformation often brings complex changes and involves various functions within the organization. These complex changes require a leader who is able to integrate the power of technology with the organization's business strategy. Organizations need leaders who understand the opportunities presented by technology and are able to develop organizational resource development strategies to create innovation within the organization (Cheng & Wang, 2023; Marx et al., 2021). Leaders also play a role in creating an organizational culture that supports digital innovation. Some literature indicates that one of the inhibiting factors in digital transformation is resistance to change that arises from within the organization. A rigid organizational culture and a lack of openness to experimentation can hinder the process of adopting new technologies. Adaptive and visionary leaders play a role in creating a culture that encourages collaboration, learning, and experimentation in innovation development (Mollah et al., 2024; Peter et al., 2020; Yusuf et al., 2023).

Leaders with these capabilities require support from top management. 18% of the literature mentions that digital transformation requires top management support. The role of top management in digital transformation is to ensure that digital transformation is not merely a short-term technology project, but an integrated part of the long-term business vision and strategy (Fernandez-Vidal et al., 2022; Peter et al., 2020). Top management can mobilize all elements of the organization to work in an integrated manner to implement digital transformation through a defined vision and strategy. Top management can also drive changes in the organizational culture that support the digital transformation process (Cichosz et al., 2020; Saarikko et al., 2020; Zhang et al., 2023). Changes resulting from the digital transformation process often face challenges of resistance. Therefore, top management needs to play a role as a party capable of encouraging changes in organizational culture to become more open to innovation.

Performance

The sixth theme is performance. This theme encompasses two key success factors for digital transformation: customer experience and sustainability. Customer experience is often associated with an organization's ability to utilize digital technology to improve the quality of interactions with customers (Fachrunnisa et al., 2020; Masoud & Basahel, 2023). Organizations that are able to leverage digital technology to deliver a better customer experience will have a greater ability to maintain customer loyalty and acquire new customers (Ahmad et al., 2021; Pierre, 2023; Zhai et al., 2022; Ziółkowska, 2021). From the TOE Framework perspective, customer experience is a key success factor for digital transformation, encompassing the environmental context. 18% of the literature indicates that many organizations utilize digital transformation to create integrated customer experiences, both online and offline. This demonstrates that improving customer experience is a driving factor for organizations to undertake digital transformation.

Conversely, 13% of the literature explains that sustainability is one of the goals of organizations undertaking digital transformation. Several studies emphasize that digital transformation can support more sustainable business practices by optimizing resource use, reducing waste, and increasing business process efficiency (Gomez-Trujillo & Gonzalez-Perez, 2022; Kitsios & Kamariotou, 2021; Teng et al., 2022). Digital transformation enables organizations to reduce paper use, improve supply chain efficiency, and optimize the use of energy and other resources. Other studies suggest that sustainability can also enhance an organization's reputation and strengthen relationships between stakeholders (Guo

& Xu, 2021; Ma et al., 2022; Rosero-Garcia & Montano-Salamanca, 2024). From the TOE Framework perspective, sustainability is part of the environmental context.

CONCLUSION

Digital transformation has become a key strategic issue for organizations as they face changes in the business environment due to the development of information technology. This study aims to identify the factors determining the success of an organization's digital transformation using the TOE framework. The results show that the success of digital transformation is not solely influenced by technological factors, but also by the interaction between technological, organizational, and environmental factors. From a technological context, several factors determining the success of digital transformation include social media, blockchain, cloud computing, and e-commerce. Cloud computing technology enables organizations to flexibly access digital resources, thereby increasing the efficiency of data management and information systems. Blockchain technology enables companies to conduct digital transactions transparently and securely. By adopting these digital technologies, organizations lay a crucial foundation for developing a digital ecosystem that supports innovation and efficiency. From an organizational context, factors determining the success of digital transformation include digital innovation, business models, digital leadership, top management support, innovation capability, and organizational capability. Capabilities are essential for organizations to optimally utilize digital technology to develop new products, services, and business models. Furthermore, digital leadership plays a crucial role in establishing a strategic vision for digital transformation and driving organizational cultural change that supports innovation. The role of top management support is very important in providing the necessary resources and ensuring that the digital transformation strategy can be implemented throughout the organization. From an environmental context perspective, there are two determining factors for the success of digital transformation: customer experience and sustainability. Few studies have analyzed the success factors of digital transformation from an environmental context perspective. Digital transformation enables organizations to improve customer experience through the integration of digital platforms and the more effective utilization of customer data. Regarding sustainability, digital transformation can support more efficient and sustainable business management.

The results of this study confirm that the success of digital transformation is not solely about technology adoption, but also involves the organization's ability to integrate that technology through business strategy and capabilities. Organizations also need to consider changes in the external environment, such as customer experience and sustainability issues. Therefore, an approach based on the TOE Framework provides a comprehensive perspective for understanding the success of organizational digital transformation. This research provides a theoretical contribution to the growing literature on digital transformation undertaken by organizations. This research contributes by expanding the conceptual understanding of the determinants of digital transformation success by integrating various empirical findings into the TOE Framework. This research expands the application of the TOE Framework to explain the more comprehensive process of organizational digital transformation. This research also enriches the digital transformation literature by demonstrating that the success of digital transformation is influenced not only by technology adoption but also by an organization's ability to integrate that technology with its business strategy and business model. The results of this study provide practical contributions to organizations undergoing digital transformation. The results indicate that the success of digital transformation is highly dependent on the strategic role of top management and organizational leadership. Top management needs to establish a clear digital transformation vision and develop strategies that integrate digital technology with organizational goals. Organizations also need to create a culture of innovation that supports continuous experimentation and learning. This is done so that employees can adapt to rapid technological change. This research has provided a comprehensive overview of the factors for successful digital transformation. However, several opportunities for future research remain. Future research could develop an empirical model that examines the relationship between various factors within the TOE framework and organizational performance. Future research could also explore how the determinants of digital transformation success differ across industry sectors, such as the service sector, agriculture and livestock, the culinary industry, or MSMEs.

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