Impact of Coronavirus on digital transformation in private sector organisations in developing countries

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ABSTRACT

The onset of the COVID-19 pandemic has introduced a new phase of company operations. The advent of digital transformation (DT) has fundamentally transformed the global business landscape. Despite the global prevalence of this phenomena, there is limited understanding of digital transformation (DT) in the context of COVID-19 and its impact on private sector organisations in developing nations. This study investigates the impact of COVID-19 on the process of digital transformation in privately-owned companies located in underdeveloped nations. To accomplish this objective, a systematic literature review was conducted following the PRISMA (2020) principles, resulting in a selection of 26 studies. This study employs an inductive methodology, where pertinent topics are identified as they arise from the literature throughout the analysis stage. The technology-organisation-environment framework (TOE) was subsequently employed to provide a contextual framework for these issues. The research findings suggest that the presence of resources, both financial and technological, is a crucial determinant in the adoption of digital transformation. The adoption of DT has been significantly influenced by various factors, including the role of governments, competitive forces, security, and other relevant considerations. Although organisations in underdeveloped nations encountered numerous hurdles, it was found that digital transformation progressed rapidly in all areas. Companies underwent substantial transformations to embrace digital transformation (DT), including the use of digital business models to facilitate remote operations and heightened investment in education, skills, and innovative digital tactics. Given the recent emergence of COVID-19, there remain numerous uncertainties regarding the enduring impacts that COVID-19 has had on organizations.

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Introduction

By early 2020, reports circulated about the widespread prevalence of the Coronavirus or COVID-19 pandemic. Nations were compelled to implement stringent lockdown measures in order to mitigate the transmission of the virus (Cicchiello, 2020). Organizations faced the challenge of navigating unfamiliar territory in their efforts to adapt. They had to reconsider their operational models and discard outdated analog systems in favor of modernized digital ones (Nachit & Belhcen, 2020). Employees were instructed to work remotely, which necessitated the utilization of more digital technology. Digital transformation (DT or Dx) has transitioned from being a strategic option for enterprises to being an essential requirement for sustaining company activities amidst the COVID-19 pandemic (Cicchiello, 2020). Moreover, as stated by Nachit and Belhcen (2020), the adoption of DT by organizations is essential for attaining elevated levels of quality and sustainability in the long term, making it imperative for enterprises to incorporate it.

The precise meaning of digital transformation is continuously developing. However, the term refers to the process of incorporating technology into a company's activities in order to enhance production levels (Van Dyk & Van Belle, 2019). Regrettably, there is an unequal distribution of access to networks, devices, and the necessary abilities for efficient navigation of computerized spaces among various organizations and countries (Beaunoyer, Dup’er’e, & Guitton, 2020). Due to the lack of access to resources from...
industrialized nations, developing countries had a challenge in implementing digital transformation in organizations during the COVID-19 pandemic. Failure to surmount this hurdle could result in business failures (Muditomo & Wahyudi, 2021).

Organizations in developing economies encounter substantial obstacles during the process of digital transformation. Developing countries face challenges in attaining digital readiness, as indicated by Cisco's global digital readiness index (Cisco, 2020). Digital readiness refers to the attitude and ability to embrace and incorporate digital technology, as well as the capacity to produce novel and innovative opportunities for its utilization. The digital readiness index assessment by Cisco reveals that developing countries attained a score of 4.32, meeting only 14 out of the 25 criteria for digital readiness. In contrast, developed countries had a significantly higher score of 20.56 out of 25 (Cisco, 2020). Developing countries face more difficulties in implementing digital transformation due to their insufficient level of digital readiness (Cisco, 2020; Nachit & Belhacen, 2020).

The impact of COVID-19 on the process of digital transformation in private sector organizations in underdeveloped countries remains uncertain and requires further investigation (Soto-Acosta, 2020). While there is a considerable body of research on digital transformation in industrialized nations, there is a notable scarcity of studies examining DT in developing countries during the COVID-19 pandemic. This research study seeks to examine the influence of COVID-19 on the adoption of digital technology in developing nations. It strives to evaluate and comprehend the specific aspects that were impacted by this transformation and identify the necessary adjustments required to accept digital technology. This will aid organizations in developing nations in navigating the necessary changes to ensure successful adoption of DT and in enhancing their existing knowledge and understanding of DT, enabling them to make more informed decisions.

The primary research inquiry (RQ) addressed in this study is: What is the impact of COVID-19 on digital transformation (DT) inside private sector entities in developing nations? The following sub-questions are included:

i. What were the contributing elements to the implementation of Digital Transformation (DT) in private sector organizations in underdeveloped nations amidst the COVID-19 pandemic?

ii. What modifications are necessary in private sector organizations in underdeveloped nations to facilitate the adoption of digital transformation during the COVID-19 pandemic?

Literature Review

This section introduces digital transformation (DT/Dx) and how COVID-19 has impacted the DT phenomenon. The Technology, Organisation, and Environment theoretical framework (TOE) is used to perform this factor-based impact analysis. Finally, the modification of the factors identified as forming the framework allows for its application to the adoption of DT post-COVID-19.

Digital Transformation

Digital transformation is a more recent buzzword. However, digital mediums were already understood in the early 2000s (Schallmo, Williams, & Boardman, 2017). The digitisation of manual systems began in the early 2010s and marked the beginning of the DT era. Digitalisation allows manual tasks to be converted to a digital form, so electronic devices can aid in storing, accessing, and transferring vital information (Amankwah, Khan, Wood, & Knight, 2021). This was supported by the invention of “smart devices” (smartphones, tablets, etc.) that can connect, share and interact with their user and other smart devices (Silverio, Renukappa, & Suresh, 2018). The definition of DT is difficult to pinpoint as there are differing opinions on the topic. However, it is understood that DT involves integrating technology into businesses to transform and radically improve an organisation's strategies and operations (Mićić, 2017; Reis, Amorim, Melão, & Matos, 2018; Van Dyk & Van Belle, 2019). It is important to note that digitalisation is interchangeable with digital transformation (Schallmo et al., 2017). However, Kraus et al. (2021) argue that these are two different concepts since DT refers to changes arising from digital technologies, and digitalisation is a process of converting analogue information into a digital form.

DT consists of various technologies, including social media, cloud computing, etc (Gebayew, Hardini, Panjaitan, Kurniawan, & Suhardi, 2018). The intelligent use of digital technologies aids the transformation of business models by allowing them to be automated or extended, therefore facilitating DT and positively impacting innovation and productivity (Kraus et al., 2021).

These transformations aim to optimise technological, organisational, and environmental factors, leading to companies becoming more customer-centric and, therefore, more effective and efficient (Kraus et al., 2021). Adopting DT promotes growth and allows organisations to be relevant and competitive (Backhouse & Manda, 2017).

Impact of digital transformation

The implementation of local and national lockdowns, social distancing, quarantine periods, and many other regulations have driven various organisations to change their business models at extremely short notice (Amankwah et al., 2021). The risk firms faced forced many to embrace high levels of digitalisation (Amankwah et al., 2021). This means that a few months within the pandemic has catapulted digitalisation levels worldwide into the future.
A significant impact is a trend toward the digitalisation of business models, which has seen businesses go from face-to-face operations to operating solely online to keep employees and consumers safe by reducing the risk of spreading the virus (Amankwah et al., 2021; De’, Pandey, & Pal, 2020). This led to many organisations turning to e-commerce platforms to continue operations.

The need to operate remotely has led to increased investments in organisations’ technology. The technologies adopted by organisations aid employees in doing their jobs, but they also identify tasks that could be automated (Banga & Velde, 2020). For example, video conferencing applications to hold meetings. Although many people lost their jobs due to COVID-19, the rise of DT has also created new opportunities within companies such as companies creating roles for “YouTubers” and “tiktokers” to attract customers (Soto-Acosta, 2020). These roles would not have existed a few years ago, but they are now in demand due to COVID-19 and DT.

Another significant impact on DT is that since there is a surge in digital technologies, there is also a rise in cybersecurity incidents, such as online scams, data breaches, intrusions, and online fraud. This has forced companies to take their cybersecurity policies more seriously to safeguard IT assets.

Since COVID-19, the research in this area has focused on the factors which have influenced the adoption of DT. These factors are further explored and contextualised within a theoretical framework.

**Theoretical and Conceptual Background**

From the review of past literature, two dominant theoretical frameworks have been applied in DT namely, the Technology-Organisation-Environment framework (TOE) and the diffusion of innovations theory (DOI) (Classen, Garbutt, & Njenga, 2021; Gazperlin, Puchihar, & Borstan, 2021). While DOI addresses many issues, it fails to consider external factors, the firm’s resources, and social support (Classen et al., 2021). The failure to consider external factors directly affects technology adoption, especially in developing countries during COVID-19, since these environmental factors are out of organisations’ control.

The TOE framework was developed by Tornatzky, Fleischer, and Chakrabarti (1990) and considers three elements: technological, organisational, and environmental contexts. These elements are essential to consider when adopting new technologies (Bryan & Zuva, 2021). The technological context refers to the technologies that are relevant and accessible to the firm (Bryan & Zuva, 2021), either already implemented or available on the market (Baker, 2011). The organisational context refers to the firm’s characteristics, such as the managerial aspects (including communication and support) and the availability of resources (financial, technology, skills) (Baker, 2011; Hoti, 2015). The environmental context extends to external factors and can also be defined as the institutional context (Hoti, 2015). It refers to the organisation’s industry dealings, such as business partners or even industry competitors; government interventions, such as laws, standards, or policies (Baker, 2011); and in this study, factors such as access to the internet and technology infrastructure that the business cannot control.

**Factors affecting DT in developing countries**

This section explores the various factors which affect the adoption of DT in organisations. These factors are discussed within the TOE framework’s technological, organisational, and environmental contexts. Figure 1 illustrates the initial findings of the literature review. This diagram shows the identified factors which influence DT and places them within each context of the TOE framework.

**Technological Factors**

Technological factors have three characteristics that affect the adoption of DT namely complexity, compatibility, and relative advantage/ perceived benefits (Olanrewaju, Hossain, Whiteside, & Mercieca, 2020). These factors are seen in Figure 1. The complexity and compatibility of new technologies work hand in hand. Complexity impacts adoption because new technologies which are challenging to use may require significant changes to existing work and business processes (Classen et al., 2021). Technology compatibility refers to integrating new technologies into existing systems, processes, and business problems (Savola, Tuohimaa, & Berg, 2018). Compatibility with technology is also affected by the willingness of employees to accept change. The relative advantage of new technologies comes from the anticipated benefits that the new technology can provide to a specific organisation (Madukwu et al., 2016).

Some authors believe the complexity or compatibility of technology a business can use depends on the availability (or lack) of technical skills and digital literacy within the business (Van Dyk & Van Belle, 2019). While this may be true, for this study, we will consider skills as part of the organisational context.
Figure 1: Diagram illustrating factors of the TOE Framework

Organisational Factors

The organisational factors within this context are top management support, digital strategy, and organisational resources (Classen et al., 2021; Gazperlin et al., 2021; Gono, Harindranath, & Ozcan, 2013). Resources cover various factors, including financial resources, and technical skills and knowledge (Alsheibani et al., 2018) (See Figure 1).

Top management support pertains to managers' level of support and commitment, and is crucial as top management must approve technology adoption and allocate resources accordingly (Classen et al., 2021; Savola et al., 2018). The lack of planning and support may leave employees without context and a clear understanding of what needs to be done. According to Deloitte's digital disruption report, 46% of individuals in leadership roles in South African firms are not confident in their ability to drive DT (Deloitte, 2020). Since managers are not confident in their abilities, they lack vision and a plan to conquer DT.

Top management support and a digital strategy affect how resources are used and distributed. Many developing countries have weaker economies, thus having fewer financial resources. According to Van Dyk and Van Belle (2019), the cost of adopting new technology or changing existing technology may delay DT. Dell's 2020 survey reported that 30% of participants said a lack of budget and financial resources acted as a barrier to DT, which means they cannot afford adequate IT infrastructure (Van Dyk & Van Belle, 2019). The dire need for infrastructure is highlighted in developing countries like Angola, Afghanistan, Cameroon, and the Congo. These have scored less than 0.5 out of 4 for technology infrastructure in Cisco's digital readiness index (Cisco, 2020). However, some firms in South Africa indicated infrastructure is not a concern, as specific organisations have found ways to mitigate the problem by moving to other technologies and outsourcing infrastructure (Van Dyk & Van Belle, 2019).

Impediments such as a lack of technical skills and poor digital literacy hinder digitalisation in developing countries (Van Dyk & Van Belle, 2019). For instance, less than 30% of the population in developing regions such as Cambodia has basic digital skills such as checking your phone for emails or using a spreadsheet (Banga & Velde, 2020). In countries like Indonesia, less than 60% of tertiary-educated individuals use computers and the internet (Banga & Velde, 2020). Evidence from these countries suggests that developing nations are not yet technologically skilled enough to adopt DT smoothly. Managers have demonstrated hesitance to lead organisations to adopt DT, which directly affects employees and may make them reluctant to change operations (Classen et al., 2021). The culmination of a lack of digital skills and unwillingness to change affects an organisation's relative advantage (Classen et al., 2021). Thus, firms in developing countries allow firms in developed countries to develop a competitive advantage.

Environmental Factors

The organisation's decision to adopt technology is directly affected by the environment in which it operates (Olanrewaju et al., 2020). The environmental factors identified were government interventions and competitive pressures (see Figure 1). Government interventions include policies, regulations and legal aspects imposed on companies (Pumplun, Tauchert, & Heidt, 2019). In the context of this research, these interventions cover lockdowns, border closures, social distancing, etc. There is a grey area as to whether access to technologies and the internet form part of technology factors, as argued by Gazperlin et al. (2021). In this research,
governments in some developing countries control and maintain access to the Internet, network connectivity infrastructure, and electricity infrastructure. Access to local infrastructure is thus outside the control of organisations. This lack of access to reliable internet has significantly delayed the process of DT in developing countries (Amankwah et al., 2021). This is supported by statistics indicating that in countries like South Africa, only 65% of the population has access to the Internet versus developed countries like America, where over 90% of the population has access to the Internet (Petrosyan, 2022).

Many organisations faced intense competitive pressures, causing the adoption of DT to be driven by the fear that competitors may leave them behind (Amankwah et al., 2021; Muditomo & Wahyudi, 2021).

Changes made to adopt DT

The most significant change was the innovation of traditional business models. Firms had to digitalise their business models to accommodate the shift to working from home (WFH) and remote and online operations (Amankwah et al., 2021). If companies did not have a digital strategy, they needed to compile one to set out rules and guidelines for WFH and how to allocate resources and manage employees effectively (Gazperlin et al., 2021). The onus fell upon employers to ensure their employees had the necessary tools, supplies, equipment, and technology needed for WFH (ILO, 2020). This directly leads to increased investment in technologies e.g. laptops, smartphones, networking equipment, and software (De’ et al., 2020).

Since many employees were working from home, organisations’ security threats increased. Organisations had to implement security arrangements as a countermeasure to ensure employees could work safely from home (De’ et al., 2020). Security measures included educating employees on best practices when working from home, such as using virtual private networks (VPNs) to securely create a connection to the organisation’s networks. This included educating employees on phishing, social engineering, and other kinds of cyber-attacks. According to Banga and Velde (2020), guaranteeing skills development in the digital age has helped organisations adopt DT.

Since organisations have been operating in the COVID-19 era for over two years, changes have been implemented to ensure DT was successfully adopted. Significant changes include increased IT investment (infrastructure, digital technologies), working from home, and security awareness. While firms have identified and implemented numerous changes, many changes have yet to be implemented.

Research and Methodology

An interpretivist research approach suggests that a qualitative approach based on a systematic literature review is well suited to produce the data for the study. Interpretive approaches are suitable where there is a gap in existing knowledge (Bhattacherje, 2012). As the pandemic has only been identified since 2020 it is a relatively new context and literature surrounding its implications and adjustments is scarce (Nachit & Belhcen, 2020). A qualitative method was selected as it provides ways to explore and understand the phenomena being studied and to aid in understanding concepts, opinions, or experiences by gathering and analysing non-numeric data (Saunders et al., 2009). The main reason for using desktop research and secondary data sources is the continued threat of COVID-19 at the time of the research. Qualitative research is also cost-effective, time-saving, and flexible (Johnston, 2014).

Population and Sampling

According to Charrois (2015), more than two databases should be used for a systematic literature review search. This study used Google Scholar, Science Direct, and WorldCat databases as their resources are from accredited journals and institutions, ensuring the data obtained is ethically produced. Haddaway, Collins, Coughlin, and Kirk (2015) advise that Google Scholar can expand the scope of a systematic review by including literature that commercial publishers have not published. WorldCat was used as it provides access to more than just literary publications (i.e., audiobooks, videos, etc.). Lastly, Science Direct was used as it allows access to scientific and peer-reviewed journals. The number of databases searched was limited due to time constraints, as the process was labour-intensive and required manual review.

Ethical issues

The use of PRISMA guidelines help assess and ensure the integrity of data. It is important to note that the collected data are published articles already subjected to ethical reviews and are available in the public domain. This research thus uses secondary data and has been exempted by the university’s research ethics committee (# 00018061).

Data selection

This section focuses on data production for the study. The guidelines selected for this research are the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA 2020) since these guidelines ensure quality and replicability. The PRISMA flowchart has been used to conduct the systematic review process, as illustrated in Figure 2.
A standardised search string of all relevant terms was used across all three databases (Covid-19, digital transformation, private sector, and developing countries). The filters implemented were: A time frame of 2020-2022, only English language publications would be screened, and all publications had to be free to access. From this initial search, a total of 17 272 records were retrieved. Google Scholar returned 16 800 results, WorldCat returned 23, and Science Direct returned 449.

A reference list from each database was exported to EndNote bibliographic software. It was found that Google Scholar places a limit on the retrieved results. According to Harzing (2013), Google Scholar only shows the 1000 most cited papers to ensure the exported documents are of the highest data quality. This resulted in 1472 records that were eligible for the next screening phase. EndNote automatically removed 22 publications. These could have occurred for numerous reasons, such as incomplete or no citations, and the papers could have been removed from the relevant databases. 27 publications were identified as duplicates, resulting in 49 publications being removed and 1423 publications being left.

To reach a feasible sample, any titles or abstracts that indicated an answer to the research questions of this study were included. At the title review stage, a total of 1044 records were removed. The abstracts of the remaining 379 records were examined, and 271 records were excluded, leaving 108 publications eligible for a full-text review. The titles and abstracts were subjected to the same exclusion criteria used for the full-text review stage and additional criteria such as no mention of adopting technology and the titles being off-topic.

A set of exclusion criteria was used to narrow the list of articles by eliminating publications that did not satisfy the requirements. The exclusion criteria used were: the publications made no mention of factors that influenced the adoption of digital transformation (27 excluded); secondly, the publications were from developed countries (10 excluded); the publications focused solely on public sectors rather than private (33 excluded); and finally, the publications made no mention of any change(s) brought about to adopt digital transformation (12 excluded). A total of 26 publications were found suitable for the final research phase.

**Data extraction and coding**

Once a finalised set of publications was produced, relevant data from these publications were extracted. This extraction was done using the NVIVO 12 software. The publications were examined through an initial coding process, identifying any information that answered the research questions (Okoli, 2015). During this process, there were no predetermined themes or codes. Any data extracted
was based on open codes from the literature (Okoli, 2015). The relevant codes were then condensed further into themes and subthemes, forming the basis of this research's findings and discussion.

Based on the extracted data from the codes, various themes were identified. These themes were then linked to the selected theoretical framework (TOE). It is important to note new themes have emerged from the analysed data, which may not have been found or contextualised during the initial exploratory literature review. These new themes or factors provide additional insights that may be relevant in the specific context of DT in developing countries.

**Findings**

The findings from the thematic analysis and their relevance are discussed together in a single section to limit the duplication of content. The combination of findings and the discussion thereof is common in qualitative research, where the explanation of findings may be more verbose than in quantitative studies.

The data discussed in this section is based on the thematic analysis of the 26 articles that form the study sample. The characteristics of these articles provide a brief contextual introduction to the data. All studies cover developing countries or regions. The term regions is used to group countries into continents, as some studies grouped developing countries in this way. Asia is the most commonly studied region, featured in at least 12 different studies, including India, Indonesia, and Vietnam. Studies focused on Africa included, for example, South Africa, Ghana, Morocco and Jordan. Three studies focused on European countries, including Georgia and Romania. Two studies focused on South America and mentioned Brazil.

A variety of research methodologies were represented in the sample. The most popular approach to obtaining data was a survey followed by interviews. Some studies used a mixed methods approach. Other approaches used were systematic literature reviews, case studies, and a descriptive design approach. Some studies covered multiple units of analysis, such as people, places, jobs, etc. Due to this, it is not easy to quantify the results in terms of specific units of analysis. However, some popular trends can be noted. Many of the studies focused on DT or concepts and applications of DT within businesses. Therefore, the most common unit of analysis was a business or some variation of this e.g., banks and SMEs. Another common unit of analysis was whole countries or regions and characteristics of jobs.

The systematic literature review results will be presented as responses to the research questions posed at the outset.

**RQ1: Factors influencing DT**

This section addresses: What factors influence DT in private sector organisations in developing countries during COVID-19? The TOE framework was used to contextualise the range of factors identified. Most factors, directly or indirectly, played a role across all three contexts of the TOE framework i.e., technological, organisational, and environmental. The inter-relatedness of technological and organisational factors is particularly noteworthy. However, they were linked to one context for reporting purposes for simplicity and to avoid repetition. The factors identified during the thematic analysis are categorised in Figure 3. The organisational context dominates the findings as the results show that the resources of the business, specifically the financial and human resources, are key determinant factors of the DT process. Financial resources played a significant role in all three contexts, impacting the development of skills, purchase and implementation of technology (technological), and provision and maintenance of infrastructure (environmental).

![Figure 3: Summary of the factors affecting DT across the TOE Framework](image)

A study conducted by Klein and Todesco (2021), who interviewed 10,384 participants from SMEs, found that at least 7% of these businesses had to cease operations, and 59% of companies had to close for more than two months, generated no revenue due to
COVID-19. In addition, organisations did not have the funds to invest in education and training or to employ people with these skillsets (Amankwah et al., 2021; Bai et al., 2021). The lack of employees' digital skills directly affected the complexity and compatibility of integrating and using existing and new technologies, i.e. the technological context. (Klein & Todesco, 2021; Ofosu-Ampong, 2021). This resulted in organisations spending more time and resources on new hires and reskilling their current employees, slowing the adoption process (Agba et al., 2021; Akpan, Udoh, & Adebisi, 2022).

The complexity of technology directly impacted how compatible new technologies were with existing work practices. Hoang, Nguyen, and Nguyen (2021) determined that the compatibility of technology with existing work practices positively influenced technology adoption since there is less complexity in configuring new technology to work with existing procedures. Since employees and some managers lacked essential skills, they were often more reluctant to use new technology and change their business practices (Amankwah et al., 2021). This also affected the transition to work-from-home. Grigorescu and Mocanu (2020), in a Eurofound survey of 42 participants, found that at least 45% of employees who did not WFH during the pandemic would never want to WFH. This illustrates the reluctance of employees to change traditional methods of operation. It should also be noted that 5.26% of respondents felt WFH was counterproductive.

Many employees with poor digital skills and knowledge were often unaware of the security implications of new technologies, leaving organisations more susceptible to attacks on their digital information (Agba et al., 2021). This was mainly because many employees were working from their personal devices and not the ones the organisation provided. Rachmawati et al. (2021) in a survey of 176 Indonesian respondents, found 83% reported that their companies did not provide them with tools for WFH, and they thus used their own devices. This increased their vulnerability to cyber-attacks.

Senior business leaders and managers who lack the appropriate digital skills and knowledge were unable to effectively manage their employees during the pandemic and did not know how to construct and implement a clear digital strategy (Klein & Todesco, 2021; Olokundun et al., 2021). Gigauri (2020) studied 33 Georgian human resource management employees who suggested that their biggest challenge was a lack of knowledge of new technologies and crisis management. The lack of guidance and a plan to tackle DT significantly slowed down adoption. Similarly, firms in developing countries that were already short on resources and lacking a digital strategy could not adequately use their resources to their full potential (Perwej, 2020).

Apart from revealing how many factors are interrelated, the thematic analysis also uncovered details that were not initially evident from the introductory literature used to develop the bounds for this study. For instance, within the organisational context, employee attributes, attitudes, and concerns over work-from-home practices, feelings of isolation, and stress, were revealed as significant factors in DT during COVID-19. Likewise, employees' awareness of and practices related to cybersecurity as a factor in the adoption of DT were foregrounded in the analysis. Another influential factor was the role of governments, as the harsh lockdowns placed financial strain on businesses (Amankwah et al., 2021). Klein and Todesco (2021) report approximately 43% of businesses had to halt their operations due to the pandemic. Governments also had a role to play in the technologies available to firms, as some governments-maintained network infrastructures, which directly impacted internet access (Katz et al., 2020). At least 60% of the respondents who took part in the study conducted by Rachmawati et al. (2021) revealed that their internet connection presented issues and that they could not focus on work while working from home. Governments played a vital role in upskilling the workforce in many developing countries. For instance, Indonesian governments provided $227 million for upskilling programs through vocational training on digital platforms to preserve jobs during the pandemic (Park & Inocencio, 2020).

The government injection of capital helped firms adopt DT more smoothly (Trawnh et al., 2021). The thematic analysis also revealed that some firms used their competitors to their advantage. Firms that faced competitive pressures turned to each other so they could double their resources, hoping that it would make the DT process more manageable (Klein & Todesco, 2021; Ofosu-Ampong, 2021). This also affected the transition to work-from-home. Grigorescu and Mocanu (2020), in a Eurofound survey of 42 participants, found that at least 45% of employees who did not WFH during the pandemic would never want to WFH. This illustrates the reluctance of employees to change traditional methods of operation. It should also be noted that 5.26% of respondents felt WFH was counterproductive.

**RQ2: Changes required to adopt DT**

To answer the question: What changes must be implemented in private sector organisations in developing countries for them to adopt DT during the COVID-19 pandemic? Figure 4 summarises the changes implemented within businesses in developing countries in response to the pandemic that accelerated DT. These changes and their effects on the businesses are categorised according to the contexts of the TOE framework.

Some significant adjustments firms made to adopt DT were increased technology and skills investment (Agba et al., 2021; Katz et al., 2020). As mentioned previously, a substantial barrier to adoption was inadequate financial resources. Firms combated this by using monetary stimulus packages and educational initiatives set up by governments (Klein & Todesco, 2021). For instance, the Brazilian government provided SMEs with a $20 billion budget to cope with the pandemic (Klein & Todesco, 2021). This reduced the financial strain on businesses since they could adopt new technologies.
Figure 4: Summary of the changes implemented and resultant effects on DT in the TOE contexts of businesses

At an organisational level, firms took advantage of government training and education initiatives. Gigauri (2020) reports 17% of surveyed enterprises want to move online but need the required skills. Therefore, the additional finance and upskilled workforce allowed them to take on the task of implementing new technology and DT. Investing in education and taking advantage of government initiatives also meant that managers were better equipped to manage their workforce and create and implement digital strategies (Bai et al., 2021; Hoang et al., 2021).

Creating digital strategies allowed managers to allocate their resources better and identify alternative ways of continuing business operations (Bai et al., 2021). Firms had to change their business models, work practices, and culture. It created a new dynamic to allow firms to adopt DT. Most of the technologies adopted by companies were tools to allow employees to work from home (Amankwah et al., 2021). By adopting free and previously unexplored digital technologies as part of their DT, firms also created many new job roles. This allowed firms to develop a greater talent pool with more skills and use highly specialised technologies (Park & Inocencio, 2020). Firms also formed strategic alliances to ensure they had adequate resources to continue operations. This allowed them to pool their collective resources together and draw on them to mitigate the effects of the pandemic (Klein & Todesco, 2021).

With a focus on supporting WFH, firms also increased their investment in software to ensure that cybersecurity concerns could be managed and mitigated. According to Klein and Todesco (2021), the pandemic has accelerated the adoption of digital technologies by approximately five years in 8 weeks.

The COVID-19 pandemic required firms to have an online presence and saw many firms turn to freely available social media and e-commerce platforms to keep their business afloat (Klein & Todesco, 2021; Nachit & Belhcen, 2020). According to Rachmawati et al. (2021), 35% of the respondents used WhatsApp, 24% used email, 18% used Instagram, 15% used Facebook, 5% used Telegram, 2% used LINE, and 1% used internal custom applications.

Conclusions

The interest in digital transformation has been increasing. A preliminary examination of existing literature identified a dearth of comprehension on the elements that influence the implementation of Digital Transformation (DT) in private sector organizations, as well as the necessary modifications these organizations must undertake to achieve successful DT adoption, particularly in developing nations.

This topic was explored using a systematic literature review, using the PRISMA (2020) principles. The factors and adjustments identified during the systematic literature review were incorporated into the TOE framework. The purpose of this was to place the relevant findings within the framework of an existing body of knowledge.

The research findings suggest that the presence of resources is a crucial determinant in the acceptance and implementation of DT. Nevertheless, despite encountering significant obstacles, some organizations in underdeveloped nations experienced a notable increase in the pace of digital transformation as a result of the COVID-19 pandemic. Organizations mostly focused on augmenting their investments in education and technology as the most notable alteration. This enabled numerous organizations to effectively utilize novel technologies. Complexity was discovered to have a major impact on the adoption of digital transformation within the technological setting. This issue is mostly caused by a deficiency in digital abilities, which is a significant problem in the organizational setting. The involvement of governments had a significant role in the environmental context, particularly in terms of facilitating infrastructure development and implementing financial stimulus packages.
The systematic literature review revealed significant phenomena that were not previously recognized in the original exploratory literature analysis. These include the cybersecurity threat posed by digital transformation during the pandemic and employee-related factors such as work-from-home behaviors.

In order for DT (Digital Transformation) to be generally applicable in developing countries, these organizations require a well-defined and cohesive digital strategy to effectively implement DT. Prior to executing digital transformation (DT), companies must carefully assess their digital skills and resource capacities as part of their digital strategy. In order for firms to embrace Digital Transformation (DT), they must recognize that it will necessitate a substantial investment in novel technologies and educational activities to retrain and enhance the skills of their employees. Managers and owners should prioritize acquiring new skills and efficiently helping and overseeing their personnel.

An inherent constraint of utilizing secondary data is the potential mismatch between the obtained data and its original intended use (Johnston, 2014). This assertion was substantiated during the course of doing research for this project, necessitating the handling of incomplete or restricted data. The primary obstacle encountered was the scarcity of literature pertaining to the desired geographical region, specifically underdeveloped countries. Qualitative methods require a significant amount of effort, as data analysis needs to be performed manually. One further constraint of secondary data is the absence of authority over the data's caliber (Sindin, 2017). Frequently, the verification of resource quality is lacking, therefore a quality assessment was incorporated into the research approach to guarantee that the utilized data adhered to acknowledged quality criteria.

Subsequent studies might broaden their scope by examining the specific characteristics of organizations, such as their kind and size, in order to investigate the impact on the adoption of digital transformation (DT) and the extent to which they had to modify their business processes to accommodate DT. There is a need to expand and thoroughly investigate the TOE framework in order to provide more clarity on the elements that encompass all three settings. This can also assist in providing context for factors that are not addressed by the TOE framework. Insufficient evidence exists regarding the enduring consequences of elevated levels of DT. This is mostly due to the fact that the COVID-19 pandemic is a recent occurrence, and further research is needed to understand its lasting effects on organizations in developing nations.

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