Establishing organisational resilience through developing a strategic framework for digital transformation

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Abstract

Purpose – The purpose of this paper is to present a strategic management framework for a successful digital transformation (DT) roll-out aimed at enabling organisational resilience. The study aims to identify the critical areas of consideration for management to strategically approach DT in order to build resilience.

Design/methodology/approach – The research study is based on the 3Ps framework: (1) people (culture, capabilities, engagement and well-being), (2) processes (systems) and (3) plant (technological infrastructure and tools). The research methodology is a qualitative study comprising semi-structured in-depth interviews, conducted with industry experts in different sectors undergoing major digital disruptions such as financial services, mining, oil and gas, energy and retail.

Findings – The research findings show that the successful roll-out of an organisation's DT is largely driven by the people elements incorporating organisational culture, workforce skills and training and employee well-being. It also highlights that it is critical for organisations to invest in technological infrastructure, once the people elements have been addressed, as they are the drivers of technology implementation.

Research limitations/implications – A bigger and broader sample size can validate the elements and structure of the DT framework in South Africa.

Practical implications – The study's discussion unlocks understanding about: (1) what are the key enablers for successful DT; (2) what hinders organisations from realising the value of digital investments and (3) a strategic framework for the digital roll-out.

Social implications – Technology is impacting employees at both a personal and professional levels. Ensuring that DT rollouts are strategical implemented lowers the impact on technostress and strengthens resilience.

Originality/value – The value and practical implication of this study is that the developed strategic framework can be used by managements to enable the smooth adoption of DT toward building organisational resilience in developing countries such as South Africa with low digital maturity.

Keywords Digital transformation, Digital strategy, People, Technology, Strategic framework, Organisational resilience

Paper type Research paper

1. Introduction

The use of digital technologies to transform organisational operations has impacted various industries across the globe such as education, retail, automotive, health care, energy, financial services and manufacturing (Albukhitan, 2020; Chanias & Hess, 2016). Their ever-evolving technological systems require organisations to devise digital strategies that will ensure they

maintain their competitive advantage within the various industries, by continuously improving their value creation. Digital transformation (DT) is an ongoing process of utilising digital technologies in daily organisational activities, it utilises agility as the driver for the strategic change of (1) business models, (2) stakeholder collaboration and (3) the business' own culture (Walsh, Kefi, & Baskerville, 2010; Warner & Wäger, 2019). Organisations implement DT by utilising technology to advance core business strategy and operations (Mergel *et al.*, 2019). Therefore, organisational management needs to be able to evolve effectively with digital innovation and ensure that digital investments yield the expected return on investment, while boosting resilience against disruptions. To gain a competitive advantage, organisational leadership should exploit the opportunities and avoid the threats associated with digital technologies, as they develop business models that prioritise customer needs and experiences (Afandi, 2017; Warner & Wäger, 2019).

1.1 Digital disruptions
Vial (2019) states that DT has been experienced as an industry disruptor driven by three elements: (1) technology, (2) competition and (3) consumer behaviour, as shown in Figure 1.

Globally, it is evident that companies which prioritise continuous digital improvement of business strategies and operating models thrive as they take advantage of emerging digital capabilities that enable a competitive advantage such as Amazon, Google, Facebook, Netflix and Apple (Miguel & Casado, 2016). Their capability to adapt and accept technological advancement locates them in a unique position where they can better understand the customer and cater to their needs, thereby increasing their market share in different industries. These companies use platforms that enable them to provide targeted advertising, co-create products with customers and incorporate customer feedback appropriately. Therefore, technology can be utilised to develop new businesses and increase the stability of product delivery and services (Schiavi & Behr, 2018). Andal-Ancion, Cartwright, and Yip (2003) discuss the fact that, although it can be challenging for traditional companies to adopt DT strategies, it is vitally important to enable these organisations to retain their customers and remain profitable, as shown in Table 1. The implementation of DT has shown benefits for organisations in line with operational efficiencies, streamlined operations, reduced costs and increased quality; thus, this study aims to develop a strategic framework to roll-out DT successfully.
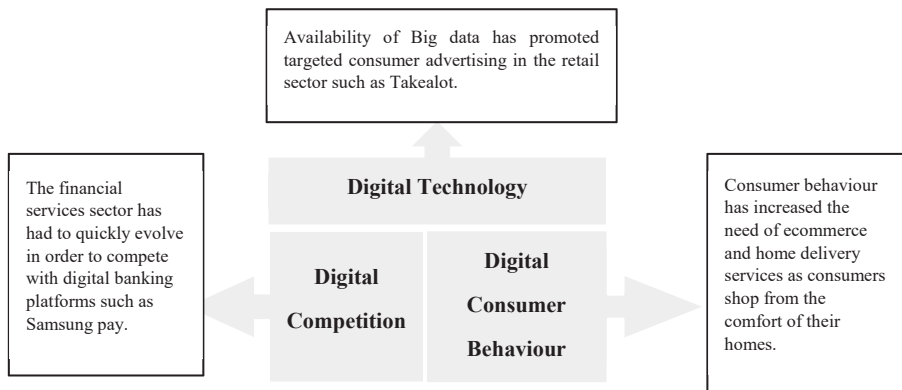

Figure 1.
Enablers of digital disruptions

Source(s): Adapted from Vial (2019)

	Major disruptors	Traditional business	Customer benefits
Retail	Amazon, Alibaba, Takealot	Retailers: Toys"R"Us, Clothing & Electronics	Easy access to e-commerce
Automotive	Uber, Taxify	Metered taxis	Safe, reliable and standardised rates
Hospitality	Booking.com, AirBnB	Hotel bookings and management	Fast, competitive and centralised
Media and Entertainment	Netflix, Showmax, You Tube, Facebook Watch	Filming industry and mainstream television	Flexibility to watch on multiple devices and to be mobile

Source(s): Andal-Ancion *et al.* (2003) and Verhoef *et al.* (2021)

Table 1.
Disruptions within
industries

1.2 Disruptions due to the pandemic

The significance of adapting and pivoting in the digital economy for most organisations was magnified during the crisis brought about by the coronavirus disease 2019 (COVID-19) pandemic. The pandemic caused an economic shock in most industries as social distancing became the new norm, forcing companies to review their business and operating models. For most businesses this meant investing more into digital platforms for customer and employee reach, automating production systems and diversifying their markets to match the evolving demand for products and services. Fletcher & Griffiths (2020) states that during the pandemic, several organisations realised that (1) they had no digital platforms for video conferencing, (2) they were dependent on on-site platforms which were not remotely accessible, and (3) they comprise a fixed workforce and organisational structures and processes. These organisations' digital maturity was very low, and thus it was challenging to adapt to the new business environment. Advancing technology such as machine learning, blockchain, geospatial location intelligence, predictive analysis, robotics and drone technology have been enablers of organisational resilience. The impact resulting from the pandemic affected workforces, technology, operations and business models as shown in Figure 2.

Technological investments impacted by the pandemic: Technology investments conducted by organisations had to be re-prioritised to those that were key to business survival during and post-pandemic. The rise of the use of cloud deployment to avoid physically located servers, the adoption of safe communication platforms to enable stakeholder engagements and the use of analytics to reach consumers better was observed across various industries including retail, financial services and manufacturing. Organisations whose digital maturity was very low pre-pandemic due to few or no technological investments had to improve their

Technology	• Interaction platforms for employees such as Microsoft Teams, Zoom, Google Meet, Amazon Chime • Customer interactions through websites, social media
Operations	• Virtual control of production lines • Automation of systems • Decentralised production plants
Business models	• Physical consultations and service offerings to digital based systems thereby reaching and stretching geographical boundaries
Workforce	• Remote working and management • Decentralised work places • Virtual teams

Source(s): Figure by the authors

Figure 2.
Areas impacted by the
pandemic

digital maturity in order to maintain business continuity in the face of a disruptive environment (Fletcher & Griffiths, 2020). Therefore, the pandemic has been a main driver for organisations to increase their digital capabilities and applications.

Rapid automation of operations due to the pandemic: Organisational operations were also highly impacted as production centres were closed. This forced manufacturing, mining and energy companies to automate their systems rapidly to continue production during and post-pandemic. Belhadi *et al.* (2020) analyses the time to recover within the operations field post a disruption through organisational resilience. A good resilience strategy will ensure that the recovery time is minimal and the impact on performance is quickly overcome. Since most organisations resilience models were not robust, the pandemic led to a lot of production coming to a standstill, which had a huge negative impact on business continuity. The pandemic forced a lot of businesses to rethink and revamp their operations by utilising modern technology to improve production during and post-pandemic. As a result, organisations have been able to extract more information from their operations, identifying opportunities to increase production and improve quality and safety through Internet of Things (IoT) solutions.

Redesigning of business models post-pandemic: For most organisations, the impact of the pandemic meant that they had to re-evaluate their business models to ensure organisational resilience and manage business risks resulting from the rapidly altered business environment. Fletcher & Griffiths (2020) states that post-pandemic, the most agile organisations would have adapted from lessons learnt from this experience. These businesses will continue to evolve in innovative ways after the pandemic. Organisations that did not build resilience during this pandemic will be disrupted during the next period of disruptive risk, which could range from poor weather, disruptive consumer behaviour or a drastic rise in competition. Thus, they should ensure that they are evolving to a higher digital maturity level.

The impact of the pandemic on the workforce: The workforce was highly impacted by the pandemic as employees could not work in centralised office spaces due to the health risks, thereby forcing organisations to allow employees to work remotely from their homes. This was challenging for organisations in South Africa that had to establish new policies and procedures to promote productive work-from-home environments. These new ways of working also caused challenges for management in leading and monitoring their virtual teams. Although the trend of virtual teams was already emerging due to globalisation and new technology, the pandemic accelerated this process.

1.3 Research details
This study aims to develop a strategic framework which management can use to implement DT within established organisations, as an approach to building organisational resilience in a disruptive environment. The digital economy has changed consumer expectations and engagement behaviours, as consumers now expect a tailored and enjoyable user experience. The qualitative study focuses on the 3P's approach to analyse the DT: (1) plant, (2) processes and (3) people. This *research contribution* is to develop a framework that can be utilised by established organisations to ensure the efficient and effective adoption of DT. The *research question is*: how can organisations enable organisational resilience through the use of DT as a tool?

2. Literature review
Organisations that have shown digital resilience are classified as innovators and early adopters during the rapidly changing work environment due to the pandemic, which has significantly disrupted the ways of working.

2.1 Organisational resilience through DT
Organisational resilience through DT has become extremely significant to the survival of
business post-pandemic, as the pandemic has impacted business models, value networks and
the technology required to thrive in the digital economy. Globally, it is evident that companies
which prioritise continuous digital improvement of business strategies and operating models
thrive, as they take advantage of emerging digital capabilities that give a competitive
advantage such as Amazon, Google, Facebook, Netflix and Apple (Miguel & Casado, 2016).
Their capability to adapt and accept technological advancement places them in a unique
position where they can understand the customer better and cater for the customer's needs,
thereby increasing their market share in different industries. These companies use digital
platforms that enable them to provide targeted advertising, co-create products with
customers and incorporate timely customer feedback. Therefore, technology can be utilised
to develop new streams of revenue and increase stability of product delivery and services
(Schiavi & Behr, 2018). Andal-Ancion *et al.* (2003) discuss the fact that, although it can be
challenging for traditional companies to adapt DT strategies, it is a vital task to enable these
organisations to retain their customers.

The ability of an organisation to evolve rapidly and adapt to changing business
environments is termed "organisational resilience". It describes the phenomenon by which a
business remains competitive when exposed to disruptive risk. Mcmanus, Seville, Brunsdon,
and Vargo (2007) describe resilience as a function of an organisation's: (1) situational
awareness for an understanding of the entire operating environment, (2) control of the main
vulnerabilities in the areas of concern during a significant disruption and (3) adaptive
capacity based on the culture and dynamics of an organisation that enables decision making
in a Volatile, Uncertain, Complex and Ambiguous (VUCA) environment. The attributional
resilience model developed by a community of interest group, focuses on the attributes that
are possessed by highly resilient organisations. These are crucial as they consider agility as a
key attribute, which agrees with our study as it models organisational agility as a key DT
success factor. The resilience triangle model analyses the process capability, resources and
infrastructure and management, people and knowledge capabilities. The herringbone
resilience model considers the organisation's capabilities, activities and characteristics
collectively, as drivers of business continuity in a disruptive environment. All these models
possess important aspects that will be considered as part of this research into strengthening
an organisation's resilience, with a focus on the organisation's capabilities, and its approach
to dealing with technostress to ensure employee well-being and improved performance. The
combined use of these resilience models is a good foundation for understanding and
extending how to build organisational resilience in the digital economy in the face of
uncertainty. The rapid growth of the use of digital technologies has been a tool utilised by
organisations to be resilient against business risks posed by rapidly evolving customer
demands, competition and the company's dynamics such as culture, ways of working and
processes.

Gibson and Tarrant (2010) discuss the principles of modelling resilience, as a good risk
management approach, since it is multidimensional and exists over a range of conditions.
Figure 3 shows three models for organisational resilience: (1) the attributional resilience
model, (2) the herringbone resilience model and (3) the resilience triangle model. Tengblad &
Oudhuis (2018) argue that organisational resilience extends beyond being a capability to a
philosophy of ensuring companies can navigate adverse, complex and uncertain situations in
a responsible and pro-active way. It defines a resilient organisation as one that uses its
financial, technical and social resources to develop long-term capabilities, in an efficient and
reliable manner, to manage risks and exploit opportunities. Resilient companies are
strategically placing themselves to exploit openings when other companies lose direction and
stop being competitive due their inability to generate sufficient survival resources.

Technology has disrupted a number of products such as telegraph, cassettes and film cameras. Less adaptable organisations have closed down due to unfavourable market and business conditions. Therefore, it is important for organisations to ensure that their resources are well taken care of, and that they continuously develop innovative ways to meet their customer demands.

2.2 The 3 Ps framework
To develop a comprehensively, mutually exclusive and collectively exhaustive approach to utilising DT as a tool for organisational resilience in the face of disruptive risk to ensure business continuity, various factors must be established within the 3Ps framework (people, process and plant). The 3Ps framework is critical in the analysis of DT adoption as the three elements should be considered as the basis of developing a comprehensive DT strategy. Therefore, this study will investigate how each of these areas can be tailored to promote organisational resilience through DT.

Plant: To ensure organisational resilience, companies need to leverage the available innovative technology to improve business performance and competitiveness. Technological infrastructure or tools are one of the main drivers of digital innovation. New technology involving Social, Mobile, Analytics, Cloud and Internet of Things (SMACIT) has led to innovative product development, improved customer experience, streamlined operations and improved business models. Hinings, Gegenhuber, and Greenwood (2018) state that "Digital innovation is about the creation of novel products and services; by digital transformation we mean the combined effects of several digital innovations bringing about novel actors, structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within organisations and fields". The Technology Enactment Framework (TEF) is used to analyse the structures and institutional arrangements on the roll-out of technological strategies. Technology is considered both objectively (technological hardware and software) and enactment (structural setups), as demonstrated by the sociotechno system described by Esteves and Joseph (2008). The diamond framework by Leavitt describes organisations as consisting of four elements: (1) actors: the people within the organisation, (2) structure, (3) tasks: processes and (4) technology. The diamond framework argues that these four elements need to be in balance for transformation to occur, although it does not provide further detail on the role depth of the elements to create value in the organisation as it does not indicate readiness toward transformation. This framework demonstrates that organisations consist of both social and technical elements, and that both are equally significant and need to work together for value creating transformation to occur. Thus, in this work it is important to consider both the social and technical elements to enable resilience through DT.

Processes: Organisational processes have been highly impacted by the quickly evolving digital technologies, as they are expected to allow for quick alterations to cater for rapidly

Figure 3.
Resilience models: attributional, herringbone and triangle
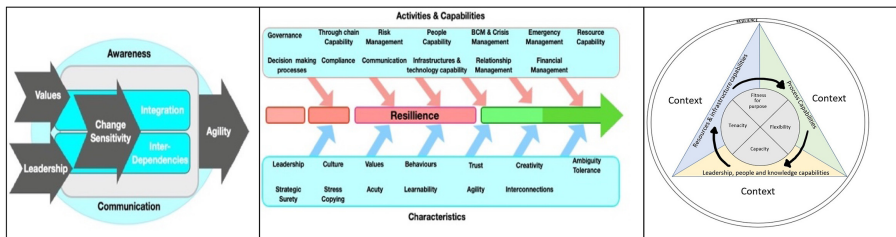
Source(s): Adapted from Gibson and Tarrant (2010)

changing customer requirements. Therefore, agility has been a key enabler in digitally developing organisations (Guinan, Parise, & Langowitz, 2019). The evolving technology has fostered processes motivated by agile methodologies as opposed to waterfall approaches. The agile manifesto focuses on: "(1) individuals and interactions over processes and tools (2) working software over detailed documentation (3) collaborations over contract negotiation (4) change of management over following a plan". Beltran and Ramesh (2018), Schwarz, Kalika, Keffi, and Schwarz (2010), and Warner and Wäger (2019) state that the dynamic capabilities to implement DT are based on the ability of the organisation to adapt to the evolving technology. The applicability of agile systems across different industries outside of the IT space has been a growing concern, but the tools have shown great benefits in catering for the rapidly evolving digital environments. Therefore, it is critical to review organisational processes and ensure that they promote agility as part of utilising DT as a tool to organisational resilience. To promote agile processes, organisations are adapting a design thinking framework which promotes system design based on user inputs, as part of the customer centric design methodology to product development.

People: In developing a successful DT approach, it is important to consider people-related issues such as culture, stakeholder engagement, learning and development. These areas are crucial to ensuring that the organisation's workforce is equipped to accept and drive the digital direction. McClelland's "theory of needs" details that the needs of an individual are acquired and shaped over time through life experiences. This theory is based on three needs for motivation: (1) achievement (2) power and (3) affiliation. McClelland states that these needs are not based on an individual's environment, culture or social status but rather motivated by recognition in their workplace (Royle & Hall, 2012). The need for achievement is driven by an urge to succeed among competitors, whereas the need for power is driven by having influence to control or lead others. Individuals whose need for motivation is through affiliation, have a desire for interpersonal and social relationships, which is fuelled by working in groups and sticking to the norm to avoid rejection. Contrary to McClelland's, Sirota's motivation theory is based on three motivating factors: fairness, achievement and togetherness (Sirota & Klein, 2013). The management should incorporate these needs for motivation in the organisation's digital strategy to promote the adoption of DT.

2.3 New business models, value creation and limitations

The implementation of DT techniques leads to revamped business models that are designed to result in new value creation for the organisation and its stakeholders. Developing an organisation's business model requires an appreciation of the key elements contributing to disruptive business models. Fost (2021) discuss four areas which influence disruptive business: key trends, market influence, industry influence and macroeconomic trends. These support the areas to be evaluated in the PESTEL model when conducting an external organisational analysis during the development of DT strategy. Therefore, it is vital for organisations to understand their operating environments and the factors that could impact their digital strategy and business models. Figure 4 explains the digital business models.

Transforming the business is implemented through revamping the business model to ensure that it focuses on improved customer experience, redesigning the brand and uncovering new opportunities (Cuofano, 2020). Based on the literature review on organisational resilience and DT, the research gap is a strategic framework that integrates the different elements of DT to enable a successful roll-out in the South African environment.

2.4 Adoption of digital technologies in South Africa

It is quite evident in the South African context where these disruptions have had a significant impact, that organisations that are not participating in the digital economy will not benefit

On demand Uber, Lyft	• Monetises through subscriptions on payment per transaction. Requires a balance between service providers and customers to enable profitability.
Ad supported Google, Facebook	• Requires very large user base. Mostly consists of hidden revenue generation. Google ads, Facebook, Twitter, Quora.
Peer to peer Uber, Bolt	• Creates a platform that enables a service provider and user, offers great user experience. Usually eliminates third party. Future could lead to self driving cars, electric scooters and bike sharing.
E-commerce/ Marketplace Amazon, Alibaba	• Using the web as a place to sell and purchase products, thus removing geographical boundaries for transactions
Freenium model Spotify, Dropbox	• Growth and branding strategy, free service to majority of users and paying customers are premium users. To ensure that: a strong customer base, a strategic conversion approach to transform free users into paid ones and a robust technological infrastructure that can deal with a large base of free users
Subscription based Netflix, Showmax	• Challenging, but allows for sustainable business models, usually sustained by original content to keep users renewing their plan. The customer acquistion cost should be less than the lifetime value of the customer. Enabled by: a loyal customer base, continuous revenue and a guaranteed sales pipeline
Open source model Github	• An open source model makes software free to access, and it generally gives the ability to a community of programmers to contribute to it. It can be later monetised through premium services or subscriptions

Figure 4.
Digital business
models

Source(s): Cuofano (2020)

from the unique value add, such as improved customer experience, efficient operating and business models. These organisations will be disrupted as consumers are opting for more convenient products and service offerings. Technological advances have resulted in the disruption of traditional ways of business globally. They demand that businesses reinvent themselves with the aim of deriving more customer value. A study conducted by the consulting firm, Deloitte Africa, maps out the Digital Disruption Index by engaging senior leaders across the African continent, with a focus on South African organisations. It indicates that 38% of organisations are in the early stage of development, 52% are digitally developing and 10% are digitally maturing, as shown in Table 2, (Deloitte Digital, 2020). Therefore, the digital maturity is low thus a huge research gap to ensuring organisations improve their digital maturity and enable organisational resilience.

A study of the South African financial services adoption of DT, analyses its adoption as a developing country (Modiba, Kekwaletswe, & Komati, 2020). South Africa's challenges to establishing DT have been caused by a steady economic growth, technology, infrastructure, cultural diversity and political issues. Therefore, industries in this country require tailor-made solutions to suit their economic and political climate. South Africa's position on digital adoption has led to further challenges in responding to the pandemic and implementing the required changes for business continuity. Modiba, Kekwaletswe, and Komati (2020)

	Organisation maturity assessment (%)	Leaders equipped to lead DT (%)
Early stage	38	36
Digitally developing	52	53
Digitally maturing	10	80

Table 2.
Assessment of digital
leadership maturity in
Africa

Source(s): Deloitte Digital (2020)

investigate how the financial services sector operates in order to be competitive in the digital economy by leveraging new technologies. The study pays particular attention to South Africa, which is categorised as a developing country, considering the fact that a large population of the country are in under-developed areas, where there is limited access to technology. Modiba *et al.* (2020) utilise the Technology Organisational Environmental framework to analyse the case of South African financial services. The results show that under the organisational context: (1) there is a culture of micro-managing working hours, as opposed to being output based; (2) scattered in-house capability building, not leveraging companies that specialise in particular skillsets offered by big companies such as Amazon and Microsoft. The technology context focused on (1) increased fault tolerance to ensure that system failures result in minimum impact to customers and (2) complex legacy systems resulting in high costs in managing demands. The environment speaks to customers who do not have the infrastructure to access innovative products due to being in under-developed areas (Modiba *et al.*, 2020).

The (Price Waterhouse Coopers, 2018) report discusses how South Africa is falling behind without DT. Despite DT being on the radar for a lot of C-suites, few organisations' digital investments result in a competitive advantage in the market. A global study showed that only 10% of manufacturing companies are digital champions, who view DT as an approach to push innovation, beyond automation and networking. In this report, it states that none of the manufacturing companies surveyed in South Africa are digital champions as most fall into the digital novice category. The research shows that digital champions are deriving more than 50% of their revenue from digital investments. Two-thirds of companies do not have a clear digital vision and strategy to support DT and the required culture (Price Waterhouse Coopers, 2018). Chief Information Officer (CIO) Africa analysed the state of DT in South Africa and the challenges presented by legacy systems (CIO Africa, 2019). Legacy systems present challenges to (1) innovation (2) creativity and (3) new cloud deployments to spark progress. Technological advances are seen to change by industry, and mostly by individual organisations such as banks, which are changing faster due to an increased threat from digital banks. Insurance organisations are investing resources to catch up with the digital economy. The introduction of Amazon and Microsoft data-centres in South Africa will result in increased migration to cloud deployment, which will, in turn, increase the uptake of Machine Learning and Artificial Intelligence (AI), to derive value from data and enable improved decision making. One of the top concerns in the technology sector, is cyber security which is crucial to protect the organisation and its customers data. Big organisations are collaborating with innovative start-ups, to build digital capability (CIO Africa, 2019). The increase in digital adoption will strengthen organisational resilience as they will be better equipped to deal with VUCA environments.

3. Research methodology

The literature review has demonstrated that there are research gaps with regard to developing a holistic framework in the South African context for management to utilise to establish organisational resilience using DT. Thus, this research aims to address these gaps by understanding the main elements of successful DT post-pandemic. To develop a comprehensive, mutually exclusive and collectively exhaustive approach for utilising DT as a tool for organisational resilience to ensure business continuity in the face of disruptive risk, various factors must be established within the 3Ps framework. The 3Ps framework is critical in the analysis of DT adoption, as the three elements are the basis of developing a comprehensive DT strategy. Therefore, this study will investigate how each of these areas can be tailored to promote organisational resilience through DT.

3.1 Research design
A qualitative approach is utilised to understand the DT elements that impacted digital maturity within the workplace in the South African context during the pandemic. The research approach will be to utilise interviews in order to have a deeper understanding of how organisations have been impacted, and how they have reacted in the face of the pandemic. The interview investigates the digital investments that organisations had prior to the pandemic and how they enabled business continuity, what further investments were injected as a result of the pandemic, and how businesses have been permanently impacted leading to a shift in digital maturity. To conduct the qualitative research, grounded theory is used to build the theoretical framework based on the collected data. The research problem is that there is lack of management frameworks to enable the adoption of DT in a developing economy. This research's main contribution is to develop an empirical framework for the smooth adoption of DT in South Africa.

3.2 Interview sample environment
Professionals were interviewed to obtain a detailed analysis on how the use of technology implemented during the pandemic has impacted organisations, and the workforce, with a particular focus on the digital environment and maturity in these periods. The data analytics utilises MAXQDA software for the coding process. Ten interviewees in digital management were chosen to represent different industries namely: mining, financial services, energy, retail and oil and gas, as shown in Table 3. The interviews were carried out through face-to-face discussion, and video calls through platforms such as Microsoft Teams and Zoom. The themes identified will then be used to arrive at an approach for utilising DT as a tool to build resilience in the face of disruptive risk. There is an equal distribution in the sample across the different industries interviewed. The majority of the interviewees were male between the ages of [18,35], each with an educational level of a bachelor's degree, at least, as shown in Figure 5. This is due to the technological space being young, and male dominated in South Africa. The interview questions are indicated in Table A1.

4. Results
The main codes resulting from the interviews on DT use and its impact on an individual's technostress were categorised and shown in Figure 6.

4.1 People element
The analysis shows that the people element is impacted the most by DT when analysing the discussions across the different industries. Interviewee 5M states that "People will not

Respondents	Age	Gender	Education	Industry
1M	Between 18 and 35	Male	Bachelors	Energy
1F	Between 18 and 35	Female	Bachelors	Energy
2M	Between 36 and 50	Male	Doctorate	Financial services
3M	Between 18 and 35	Male	Masters	Financial services
4M	Between 36 and 50	Male	Masters	Mining
5M	Between 18 and 35	Male	Doctorate	Mining
6M	Between 18 and 35	Male	Masters	Oil and gas
7M	Between 18 and 35	Male	Masters	Oil and gas
8M	Between 18 and 35	Male	Bachelors	Retail
2F	Between 18 and 35	Female	Bachelors	Retail

Source(s): Developed by the authors

Table 3.
Detailed demographics analysis

Source(s): Figure by the authors
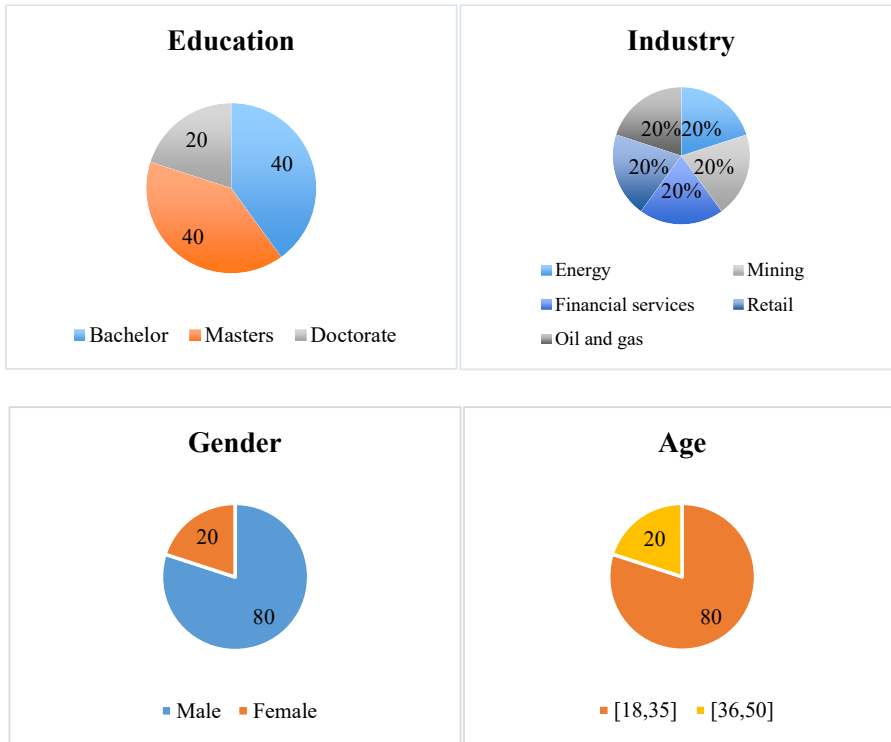
Source(s): Figure based on this study's interviews

appreciate the value of understanding data and the insights brought about by digital". Unless explained to them, this lack of understanding can hinder projects' successful DT roll-outs. 5M also elaborates that "People only prioritise data that speaks to *their* bottom line, i.e. the bank will

be most likely to have the correct customers' bank balance". Furthermore, that people who are industry domain experts would benefit from understanding digital knowledge: "because of the direction that the world is taking, it will be advantageous for the operations those people have to perform for them to have an understanding of digital, data science, and what it can offer them, what value can they extract from it". 6M states that during the pandemic, "The technology part, for ways of working, was impacted, because people did not have data for connectivity which now had to be issued". Since they had no infrastructure or connectivity to work-from-home, these factors contributed to technostress, as employees were not comfortable working through technological digital platforms because they were used to being office-based. Due to the pandemic, the people element became more crucial due to remote working. This was accelerated by the COVID-19 pandemic, during which people had to maintain social distance and set up their work offices in their homes. This caused a lot of dynamics across the different sectors for the employees and led to a lot of technostress areas, such as techno-invasion as the line between personal and professional space overlapped. This transformation also impacted communication between internal stakeholders (employees and management) and external stakeholders (customers and executive board). This is supported by the interviewee in the financial services sector who stated that: "Definitely. Working remotely has made people to think that they can always have access to a person through channels like the email system." "Because working remotely has led to one not separating the work and personal." "And I don't think we have quite figured it out, adapting to remote working".

4.1.1 Organisational culture. In addition to the people element, organisational culture is also an important factor in ensuring a conducive environment which promotes productivity and the willingness of employees to upskill and be innovative towards digital business models as supported by the interviewees: "I think culture is a big one and for people to understand from the get-go, when you're doing a digital transformation project". 2F also agrees, stating that in the retail e-commerce space: "Culturally speaking, we do accommodate, making sure that people feel that they are part of the business, that they are at one with the business and their values are shared with the business". The interviewees also acknowledged that the culture is impacted by trust issues between management and employees, stating that: "There are trust issues when it relates to job security and there is no trust in the business about the consideration of people's well-being". Thus, leadership has to be aware of the way people feel and put forward measures to avoid technostress issues: "The leadership team learnt a lot from that type of experience, knowing that it's necessary to have more transparency within the business, making sure that the business objectives are communicated better, so that people understand what the business is trying to achieve".

4.1.2 Digital skills: upskilling and reskilling in the workplace. Ensuring that employees are upskilled and reskilled to stay abreast of technological developments is crucial to enable organisations to be at the forefront of technological developments. In the mining sector, DT includes a lot of automation of processes. in fact, respondent 4M from the mining sector, commented on the techno-insecurity that is due to more technological advanced processes being introduced in this space: "I'm saying upfront, you must think about the upskilling that will be required, or where else you will want to use those people". "Think about that upfront, granted that you might not always have a need to have those people". There was also acknowledgement that in some cases the technology is not so completely advanced to allow it to operate on its own: "And that is why we can't completely get rid of people, until the time when these machines don't need to be manned". Until there comes a time when the technological advances can allow complete automation, which means that these plants would require fewer people to operate them. Stating that it might not be possible to keep all the employees, thus there should be a comprehensive upfront plan to minimise job losses, as these lead to increased technostress. 4M stated that, about the job losses: So yeah, it's certainly not possible, but it needs to be thought about it upfront so that it can be minimised and, other ways can be thought about, better to say where we can best use

these people. "And what is out there, easily accessible in the media, is that this technology is here to replace people". In terms of skills there is a battle between digital skills against industry domain knowledge. Specifically, in the mining sector they state that: "Ideally, you want to strike a balance, almost have 60 % domain knowledge and 40 % you know, on the advanced analytics side of things". "I think domain is still important, but people with domain without the advanced analytics, again, they are a problem as well". "There is an ease if you don't have domain knowledge, you will struggle with a lot of things and you will ask a lot of people questions now". "I think domain is still important, but people with domain without the advanced analytics, again, they are a problem as well". Thus, it is important for organisations to ensure that they are equipped with the correct skills set, which are comprehensive of both industry domain knowledge and digital analytical skills elaborated by 4M: "Now, you look at the finance and retail space they are way advanced in comparison to mining, and that is why if you're looking for someone who's like almost a data scientist who will work in the mining space, even if you can get someone from the banking side, you will still struggle because they don't have domain knowledge, and on the other hand, if your people are traditional engineers, and they are almost crawling at the speed of a tortoise". Upskilling in the e-commerce retail sector is an ongoing effort and 2F stated that: "There are courses that are offered to upskill you, for instance, if you want to go into operations there are courses that have been curated, in order to help you get to that point". Thus, Figure 7 shows the resulting qualitative codes for the people element.

4.2 Technology element

The implementation of value adding technology was one of the major elements identified as being crucial to the roll-out of a DT initiative. The qualitative analysis shows that it is crucial that the organisation conducts an analysis into which technologies would drive the most value, both in the short and long term. Across the different sectors, various technologies have been implemented such as machine learning, cloud computing, data analytics, blockchain and FinTech technologies. Although the implementation of these technologies is at infancy stages, some benefits have been realised in terms of understanding the plants' operational efficiencies and the consumer behaviour. In the financial services sector, cloud adoption has
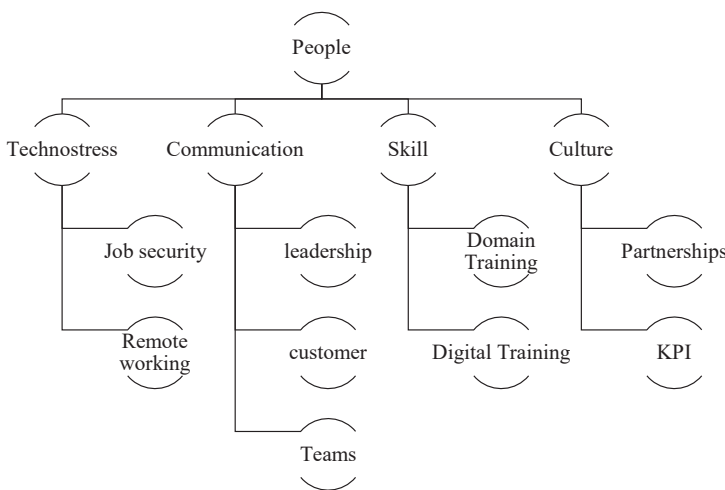
Source(s): Based on this study's output

Figure 7.
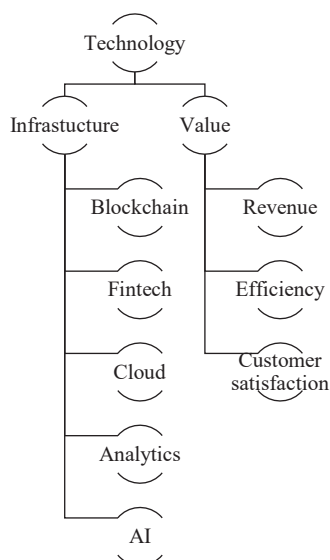People qualitative codes and categories

had a major impact, in terms of improving agility and cost reduction, as pointed out by 2M: "So pre-pandemic, we actually used Amazon Web Services (AWS), for most of our services but now we're using Google Cloud for all services". "But we had to accelerate our cloud migration. That went very well, I think, we've managed to move almost 50% of our workloads from on prem to the cloud". "And in terms of agility, and speed, for innovation speed, with the move to cloud, somehow we have managed to shorten our go to market cycles". "While moving our workloads to cloud, another important thing that we have been doing, and we are continuing to do is observability, which is basically being able to have a view of all the events or interactions that happened within our business services". "And our move to cloud has also helped a great deal with cost reduction". "So, because we no longer own very expensive infrastructure for the most part, and we're leveraging, cloud capabilities".

4.2.1 Technological infrastructure and adoption. The adoption of technologies such as blockchain has been slow, although different sectors are starting to investigate the potential that could be derived from blockchain technologies. 4M pointed out that in the South African market the use of blockchain has not been completely rolled out, but there is room to utilise the technology to model commodities and enable real time trading between stakeholders: "Most mining houses are not leveraging blockchain as they should, but I do think blockchain is being demystified and very soon it will make inroads into this space". "And I think that's where the whole blockchain technology can come in, because you can start treating this commodity in real time, because you're able to control the demand supply and link it to the exchange rates". The energy space also agrees on the slow adoption of blockchain stating that they would want to make success of the foundational technology currently being utilised before implementing more sophisticated technologies: "I really feel that we still want to make what we have work before we get to blockchain, we want to focus on something simple, before we get to advanced analytics".

4.2.2 Technological limitations and maturity. For technology implementation, some of the limitations pointed out in the mining sector are that the technology might not be fully accessible in regions that do not have highly mature DT: "I mean, we are working with global companies in terms of tech, and in as much as we have got data centres across the globe, but some of the capabilities that you might want to leverage on the cloud, they might not yet be in the country, and hence you might have to go to another region to leverage those". The energy sector also states that they are not currently using advanced technologies for their operations or to devise new business models: 1M states that: "I don't think we can say the organisation as an enterprise is one of the companies that are now adopting technology". Which is supported by 1F: "And I can say that we are looking at the technologies that are coming up, that could potentially be disruptors in the energy space". Thus, although there are pockets of excellence in terms of technology adoption in the South African market, with industries such as: financial services and retail e-commerce being more digitally mature, when compared to heavy engineering-oriented organisations such as: oil and gas and the energy space, which are not. The more mature sectors have seen the adoption of sophisticated tech such as cloud adoption, big data analytics driving Machine Learning and AI, whereas the less mature sector are still working on mastering collecting data through IoT technologies to create operational transparency through dashboarding tools such as Power Business Intelligence (BI). Thus, Figure 8 shows the resulting qualitative codes for the technology element.

4.3 Process element

In terms of processes, it is important that the organisation updates their processes to be in line with more streamlined and agile approaches to management for the changing corporate environment and consumer expectations.

Source(s): Figure based on this study's output

4.3.1 Digital governance. The main process factor resulting from the qualitative analysis is governance, which is crucial to compliance management and ensuring that there is structure in the way data is managed. In the retail e-commerce space, there is a specific focus on data governance and dedicated resources to manage this process, as stated by 2F: "So, as we understand, most of these governance and regulations would fall in the data space. So, we do have people that are responsible for privacy data governance". For the financial services, 2M stated that: "For the most part, we already had a very robust data governance". "Our data governance, which is relatively mature, I think it made complying, to GDPR and POPI act for the regulatory environment, more manageable". In the mining sector 4M stated that: "In terms of governance, I think we almost can't do without governance". "Well, you certainly need governance to help with such things. You definitely need governance to deal with the biasness, whether it's cultural, gender, colour, age". In the retail sector 2F states that: "Well, in terms of like policy and legal, we have a lot of training that happens, naturally, for people to understand what's the best Code of Conduct rules and regulations within the company governance". The energy sector states that there is a lot of governance and some of this comes with 3rd party products as stated by 1M: "We use, the state-of-the-art technology in the market and we just adopt that governance".

4.3.2 Design thinking. Also critical to product development is customer centricity, which is managed by the process of design thinking that considers the end-user design requirements during the product development process. This ensures that the consumers or end-users get brought in from the start, and are comfortable with using the product. In the oil and gas sector: "It was mentioned and understood that there will be a need for agility, there will be a need for design thinking and for sprint's". Supported by the retail e-commerce sector where it is considered for customer inclusivity: "In terms of design thinking, we are looking at customer consideration when developing solutions". In the mining sector, 4M states that: "Design thinking, it's much needed, and the industry is embracing it, but they can still improve". "And if you were to apply design thinking, you will harness from the employees

that have domain knowledge, and the employees that have little domain knowledge, but a lot of analytical expertise". "Design thinking helps you to bridge that divide, without design thinking you will struggle to bridge that divide, and have that innovation and product that will work for a company". In the energy space, 1M states that: "So no, in terms of design thinking, I don't think much of our products are centred around our customer, because the core businesses produce is electricity".

4.3.3 Agile framework. Aligned to design thinking is the use of agile frameworks during product development. The use of agile methodologies pushes for organisations to continuously reiterate with their clients to refine the user requirements. This approach has proven to be challenging in some sectors which are still operating through traditional methodologies, where project requirements are completely defined prior to starting a project. These sectors have had to find hybrid approaches to take advantage of the benefits of agile approaches, while still operating within the traditional waterfall approach. The benefits of using agile approaches are quick iterations and the ability to continuously tailor the deliverables to the customer requirements. In the financial services sector, 3M acknowledges that: "As there are big organisations, the chances are that even in our sector if we become very good at being agile, then the organisations that want to emulate, will try to emulate us in a competitive manner, rather than in a comparative manner". Also stating that the organisational culture needs to support agile processes: The process factors governance, design thinking and agility have gained implementation familiarity across the different sectors, but organisations still have opportunities to take further advantage of these elements to ensure streamlined processes and increased customer satisfaction on product development. Thus, Figure 9 shows the resulting qualitative codes for the process element.

4.4 Strategy and organisation element

The re-evaluation of business models to derive new ways to getting revenue is important to ensure that organisations are competitive and sustainable in future digital economy.

4.4.1 Digital business models. Digital business models will allow organisations to partner and operate across different sectors, while delivering value to their consumer base. One area that is applying this approach is the financial services sector that is using their base consumer to expand into marketplace businesses. In the retail space, respondent 2F states
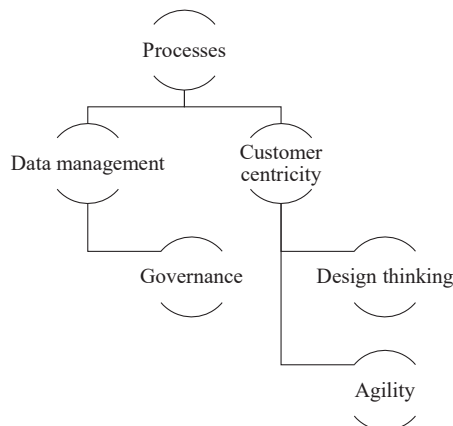

Figure 9.
Process element
qualitative categories
and codes

Source(s): Based on this study's output

that due to the pandemic: "There were a lot of changes that we made in terms of our actual product, we also made changes to suit the needs of customers at this point in time, for instance, we introduced the likes of contactless pickup, contactless delivery, so that people don't have to have as much interaction and as many touch points with other people".

4.4.2 Digital strategy. In the energy sector, they acknowledge that the development of a digital strategy is still at its early stages, and the implementation of this strategy has not yet begun: "I don't think the main aspect of the organisation's business model at the present time is on a strategy to adopt technology, although we all know the pathways, but I think what is happening at the moment is not strategic, per se". This research shows that the successful implementation of a DT initiative goes beyond the technological investment. A comment from the financial services sector on the successful roll-out of DT initiatives was: "So, basically, it has six legs to it: (1) culture, (2) technology, (3) infrastructure, (4) people, (5) processes and (6) metrics." "As much as you are focusing on the technology, you need to focus on the culture, and focus on the people. Because if you do not do that, you are going to have a technology that people do not relate to. So, knowledge and technology are not free goods, they don't just flow, the organisation needs to be deliberate on how to implement". Thus, Figure 10 shows the resulting qualitative codes for the strategy and organisation element.

4.5 Overall strategic roll-out
When it comes to the implementation of tech, organisations need to be strategic about this roll-out, and start by deriving value from fundamental tools that will allow for decision making, like dashboarding, as stated that: "Transparency is your first step, before doing more sophisticated tech, through visualisation. It could even start deriving value if its driving decision making within the organisation". When asked about the successful implementation of DT, the respondent from oil and gas, 6M, stated that: "Success will be when we have become clearer about which areas need which kind of technologies, and deploying those
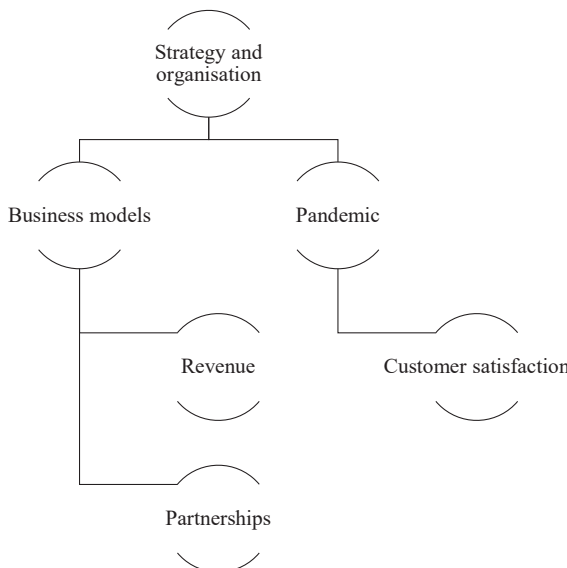
Source(s): Figure based on this study's output

technologies where we need them to achieve those gains, either from an operational perspective, or from a customer interaction perspective".

5. Formulating the DT strategic framework

The qualitative study was exploratory research that indicated that in the different industries being investigated (1) energy, (2) financial services, (3) mining, (4) oil and gas and (5) retail e-commerce, there are common themes that are crucial to the successful roll-out of DT initiatives.
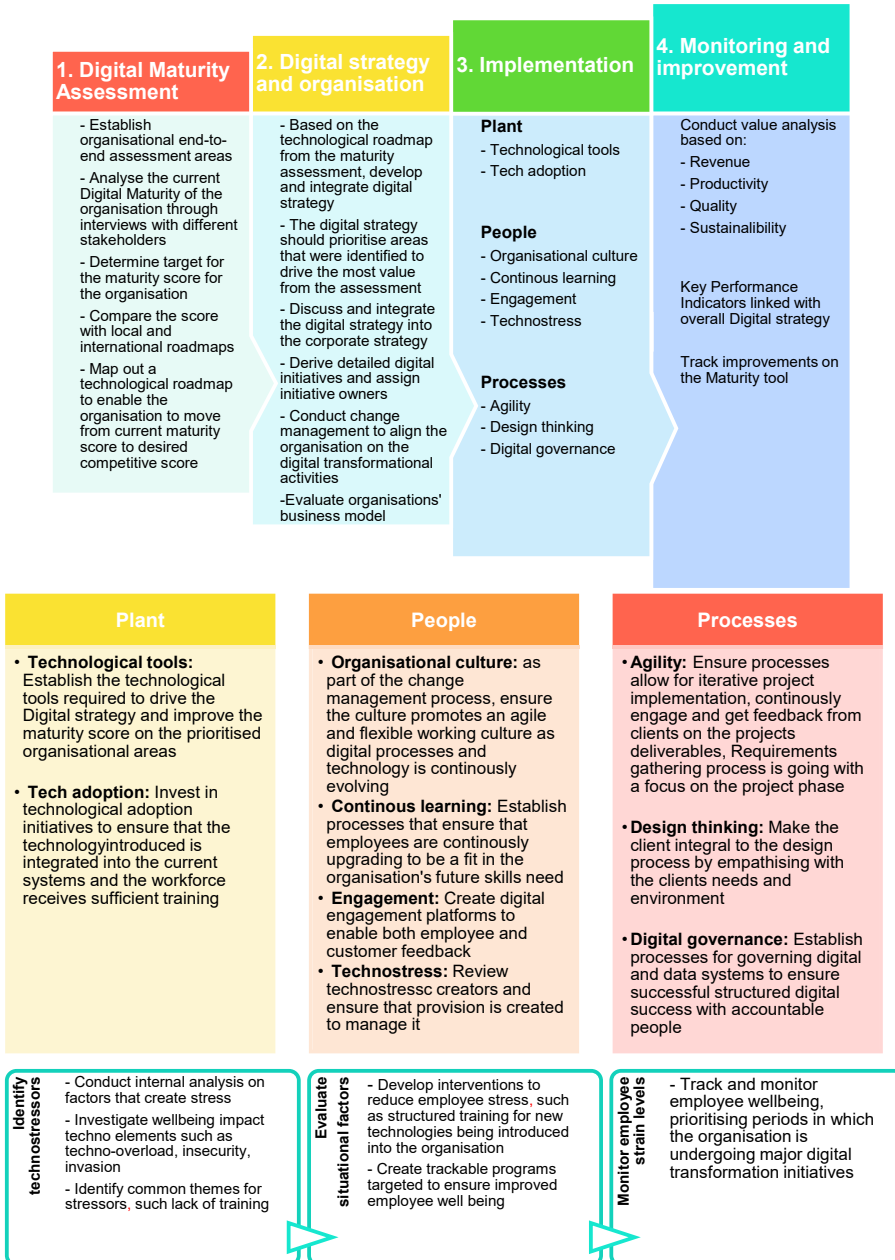
The data codes in Table 4, indicated that people and technology are big drivers for DT and these have been accelerated by the pandemic. In terms of value, the biggest drivers have been the global pandemic, forcing organisations to be more digitally mature. The qualitative analysis shows that the impact of DT on technostress has been significant, due to the increased use and dependence on digital technologies during the pandemic. Thus, organisations need to roll-out digital transformational projects strategically, considering the impact of these projects on the people element and avoiding techno-overload resulting from the consistent use of digital communication platforms and increased use of social media. To achieve this understanding of the people element, an extensive quantitative study has to be conducted to understand the technostress elements that impact employee well-being.

The framework in Figure 11 describes the practical steps that management can undertake toward a DT journey in different industries. As demonstrated by the framework, organisations should begin their journey by conducting an industry-specific digital maturity assessment to inform the digital strategy. The maturity assessment will highlight the gaps between the current maturity score and the target score. In the implementation stage, the 3Ps should be analysed holistically to ensure the success of the implementation roll-out. The framework shows more elements than technology are critical to

Codes	Categories	Themes
Job security	Technostress	People
Remote working		
Leadership	Communication	
Customer		
Teams		
Domain training	Skill	
Digital training		
Partnerships	Culture	
Key Performance Indicators (KPIs)		
FinTech	Technological infrastructure	Technology
Blockchain		
Machine learning		
Analytics		
Cloud		
Revenue	Value	
Efficiency		
Customer satisfaction		
Governance	Streamlined data management	Processes
Design thinking	Customer centred product development	
Agility		
Revenue	Business models	Strategy and organisation
Partnerships		
Pandemic	Customer satisfaction	

Source(s): Developed by the authors

1. Digital Maturity Assessment

- Establish organisational end-to-end assessment areas
- Analyse the current Digital Maturity of the organisation through interviews with different stakeholders
- Determine target for the maturity score for the organisation
- Compare the score with local and international roadmaps
- Map out a technological roadmap to enable the organisation to move from current maturity score to desired competitive score

2. Digital strategy and organisation

- Based on the technological roadmap from the maturity assessment, develop and integrate digital strategy
- The digital strategy should prioritise areas that were identified to drive the most value from the assessment
- Discuss and integrate the digital strategy into the corporate strategy
- Derive detailed digital initiatives and assign initiative owners
- Conduct change management to align the organisation on the digital transformational activities
- Evaluate organisations' business model

3. Implementation

Plant
- Technological tools
- Tech adoption

People
- Organisational culture
- Continous learning
- Engagement
- Technostress

Processes
- Agility
- Design thinking
- Digital governance

4. Monitoring and improvement

Conduct value analysis based on:
- Revenue
- Productivity
- Quality
- Sustainalibility

Key Performance Indicators linked with overall Digital strategy

Track improvements on the Maturity tool

Plant

• **Technological tools:** Establish the technological tools required to drive the Digital strategy and improve the maturity score on the prioritised organisational areas

• **Tech adoption:** Invest in technological adoption initiatives to ensure that the technologyintroduced is integrated into the current systems and the workforce receives sufficient training

People

• **Organisational culture:** as part of the change management process, ensure the culture promotes an agile and flexible working culture as digital processes and technology is continously evolving
• **Continous learning:** Establish processes that ensure that employees are continously upgrading to be a fit in the organisation's future skills need
• **Engagement:** Create digital engagement platforms to enable both employee and customer feedback
• **Technostress:** Review technostressc creators and ensure that provision is created to manage it

Processes

•**Agility:** Ensure processes allow for iterative project implementation, continously engage and get feedback from clients on the projects deliverables, Requirements gathering process is going with a focus on the project phase

•**Design thinking:** Make the client integral to the design process by empathising with the clients needs and environment

•**Digital governance:** Establish processes for governing digital and data systems to ensure successful structured digital success with accountable people

Identify technostressors

- Conduct internal analysis on factors that create stress
- Investigate wellbeing impact techno elements such as techno-overload, insecurity, invasion
- Identify common themes for stressors, such lack of training

Evaluate situational factors

- Develop interventions to reduce employee stress, such as structured training for new technologies being introduced into the organisation
- Create trackable programs targeted to ensure improved employee well being

Monitor employee strain levels

- Track and monitor employee wellbeing, prioritising periods in which the organisation is undergoing major digital transformation initiatives

Source(s): Figure based on this study's research output

Figure 11.
Digital transformation framework

DT roll-out. Thus, organisational leadership should manage all of these elements. As discussed in the literature by Ragu-Nathan *et al.* (2008), organisations should monitor work environmental stressors and derive situational factors by reducing technostress experienced by employees, thus promoting job satisfaction and satisfaction with life scale. To explore the *research's limitations and further work*: through highlighting areas that will contribute to expanding the research areas and strengthening the DT framework and employee well-being during DT. The limitations of the research are that the investigation was conducted in the South African environment. The study can be broadened from local working professionals to compare against other countries with differing maturity curves. Future study recommendations are that similar research can be included for a more significant sample:

(1) Including more industries, such as health care and manufacturing

(2) Investigate Small Medium and Micro-Enterprises (SMMEs) versus big organisational analysis to investigate the barriers to DT based on organisational size and complexities

(3) Conduct a deep dive into each focus area to develop organisational initiatives from the DT framework, detailing the project management elements such as timelines, resources and cost

(4) Include a bigger sample size, to get a bigger representation of the environment

6. Conclusion
Organisations have an opportunity to improve their value offering to their customers by utilising DT to improve ways of doing business. This qualitative study engages digital industry experts to investigate the DT elements that contribute to a successful transformation roll-out. In addition to choosing the adequate technological infrastructure, organisations should focus on the people elements including culture, communication, technostress or well-being, as being critical transformation factors. Thus, DT is more than just about technology. This research's contribution is the developed digital transformational framework to guide organisations on their journey. It highlights other critical elements beyond the technological infrastructure, such as people, process and governance. The research shows that organisations undergoing DT to strengthen their resilience should focus on ensuring employee well-being.

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Supplementary material
The supplementary material for this article can be found online.

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