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TOWARDS AN UNDERSTANDING OF DIGITAL TRANSFORMATION RISK: A SYSTEMATIC LITERATURE REVIEW

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Research Paper

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Abstract

Digital transformation research and industry adoption has been on the rise over the past decade with the majority of organisations viewing it as critical to their survival over the next five years. However, in spite of the benefits of digital transformation, it presents a clear risk to organisations such as the requirement to develop innovative products and services while maintaining a stable customer and employee experience. With an estimated 90% of digital transformation projects resulting in failures, several calls have emerged from within the academy for research exploring digital transformation risks and the methodologies to manage them. This article presents a systematic literature review (SLR) of 117 papers from high quality information systems (IS) research outlets. This research identifies six major risks that must be identified, monitored and evaluated to enable digital transformation success. These risks encompass the culture, organisation, processes, and technologies being transformed, along with the stakeholders involved in the initiative, and the overall digital transformation strategy being developed.

Keywords: Digital Transformation, Risk Management, Organisational Strategy

1 Introduction

Digital transformation has risen to prominence in academic and industry discourse as a mechanism to orchestrate the renewal of holistic aspects of an organisation's business model, operating model and value chain through the medium of technology and digital resources (Barthel and Hess, 2019; Koskinen et al., 2019; Kurti and Haftor, 2014; Mocker, 2020; Mueller and Renken, 2017; Müller et al., 2016; Tkalich et al., 2021). Successful digital transformations have been shown to generate socio-technical value for organisations such as: (i) process optimisation, (ii) increased employee agency and autonomy, (iii) improved organisational cultures within a (iv) redefined organisational model and (v) strategy which are all driven through the use of (vi) technology and digital resources (Lanamäki et al., 2020; Nwankpa and Roumani, 2016; Sun et al., 2021; Teubner and Stockinger, 2020; Yeow et al., 2018). The importance of digital transformation is clear as observed by Chanias et al., (2019) through 84% of global companies

regarding digital transformation as critical to their survival in the next five years. Digital transformation can be viewed as critical to organisations across every industry from start-ups to incumbents, private and public sector and everything in between (Haffke et al., 2017; Hess, 2022; Hodapp et al., 2022; Oberländer et al., 2021; Singh et al., 2020; von Briel et al., 2021; Weingarth et al., 2020).

In spite of the benefits and the necessity for digital transformation, the reality is that the majority of digital transformations can be classified as unsuccessful with the majority of studies presenting a failure rate of between 64% to 90%, costing organisations a collective $1.3 trillion a year in failed transformation activities (Carroll et al., 2021a; Libert et al., 2016; Munns et al., 2022; Nguyen et al., 2020; Ramesh and Delen, 2021; Rowe, 2018; Schäfer et al., 2021; Wade and Shan, 2020). There are evidently risks, threats, frictions, pain-points and barriers to digital transformations that need to be identified and managed to enable success (Hess, 2022; Legner et al., 2017). This systematic review of 117 research artefacts answers two recent calls for research within European Conference on Information Systems (ECIS) studies. Rowland et al., (2022) highlights the need for understanding why digital transformation projects fail to reach their intended goals or objectives, and although their study focuses on artificial intelligence (AI) implementation, their case study has identified holistic aspects of digital transformation that can lead to failure. Similarly, Munns et al., (2022) also highlight the need for research in managing and responding to the challenges that impact the sustaining of digital transformation. This study addresses a gap in the digital transformation body of knowledge as although there is a rich body of work exploring the success or enabling factors of a digital transformation, a risk is not merely the antithesis of a success factor (Berger and Hess, 2015; Carroll et al., 2021b; Chanias and Hess, 2016; Fehér et al., 2017; Gurbaxani and Dunkle, 2019; Matt et al., 2015; Morakanyane et al., 2020; Muehlburger et al., 2019; Reuckel et al., 2020; Russell et al., 2018; Sebastian et al., 2017). Rather, this study presents risk as a function of a threat, an uncertain event with the potential for vicious or virtuous outcomes depending on the actions taken to manage it (Pradies et al., 2020; Smith et al., 2017). These conditions have contributed to the formation of this review's research question (RQ): *What are the risk factors that accompany an organisation's digital transformation*?

Using this question as a research lens, a systematic review of ten of the top IS journals and conferences was conducted to identify the risks presented in primary research studies and the strategies used to manage these risks. This was informed by a working bibliography of 117 artefacts which will set the foundation upon which future studies of risk management strategies for digital transformation can be based.

2 Literature Review

2.1 Digital Transformation

Digital transformation, although a relatively new concept within academic discourse, can trace its origin to Leavitt and Whister's (1954) foundational research on the role of Information Technology (IT) within organisations as a tool to optimise organisational decision-making (Morakanyane et al., 2017). This was developed in subsequent research such as Markus and Robey (1988) who discuss how the increasingly sophisticated computing capabilities within business units had the potential to extend the value of IT beyond solely the IT Department (Yeow and Goh, 2015). Instead, they propose how IT resources can be leveraged to support organisational structure, employee agency, and organisational needs among others (Markus and Robey, 1988). This developed into Venkatraman's (1994) research regarding IT-enabled transformations and the value of leveraging digital channels to not only optimise but transform how organisations engaged in workflows, operations and processes. Such a transformation would require not only change in digital resources but also an inward-facing transformation of organisational cultures, processes and strategy (Barthel and Hess, 2020; Schallmo et al., 2017; Venkatraman, 1994). Presently, what is now known as digital transformation has given way to the embedding of disruptive solutions within business units such as robotic process automation (RPA), big data analytics, AI and Internet of Things (IoT) to enable organisations to leverage the value of technology in addition to

keeping pace with the external technology developments being pioneered in new, digitally-native business models across all industries (Barthel et al., 2020; Brosnan, 2021; Pappas et al., 2018; Vial, 2019). Although digital transformation is widely viewed as an enabler for organisations, supporting the development of new, disruptive business models in addition to increasing employee autonomy and optimising their value chain, it also presents a major risk as a result of the major revolution to the holistic aspects underpinning organisations required for a successful transformation (Gierlich et al., 2019; Henriette et al., 2016; Matt et al., 2016; Wade and Shan, 2020). Additionally, the literature observes that monolithic, incumbent business models can often experience difficulty in navigating the threats present within the digital landscape through issues such as stakeholder inertia and hesitance to change as a result of high costs of failure in addition to misaligned technology and leadership strategies (Andriole, 2017; Bygstad et al., 2020; Gierlich et al., 2020; Gurbanxi and Dunkle, 2019; Sciuk and Hess, 2022; Sebastian et al., 2017; Yeow and Lim, 2017). This has led to further calls for research into the risks underpinning digital transformation (Bierwolf, 2016; Carroll et al., 2021a; Hafseld et al., 2022; Munns et al., 2022; Osmundsen et al., 2018; Ramesh and and Delen, 2021; Rowland et al., 2022; Tekic and Koroteev, 2020; Tuukkanen et al., 2022).

2.2. Risk

Digital technologies and resources have become embedded in the culture, processes and values of organisations and their stakeholders. This has mandated a significant transformation in how technologies are deployed within organisations to support operations (Henriette et al., 2016; Singh et al., 2023). Such a transformation is not without its risks as observed by the aforementioned high rates of failure (Libert et al., 2016; Munns et al., 2022; Nguyen et al., 2020; Ramesh and Delen, 2021; Wade and Shan, 2020). Within the organisational digital landscape, a number of threats emerge pertaining to digital transformation such as an inability to react to technological advancements, optimised project management methodologies or external market competition (Barthel and Hess, 2019; Menzefrickea et al., 2021). In this context, a risk can be viewed as a function of these threats with the organisation able to react as they deem appropriate to continue enabling their digital transformation (Chong et al., 2020; Horlach et al., 2016). This implies a failing in the risk management strategies employed within digital transformation projects as the benchmark programme, project and portfolio management methodologies like Prince2 and Agile fail to effectively identify, monitor or evaluate risks which results in the majority of digital transformations failing not as a result of unsuccessful technology implementation but a failure in matching the correct technology to address business challenges in addition to a failure to align the organisation and its stakeholders to the new, digital-first culture required for a successful transformation (Hartl and Hess, 2017; Heavin and Power, 2018; Shahi and Sinha, 2021; Steinhinger et al., 2022). Digital transformations have been documented to fail based on a range of internal and external socio-technical factors like culture, market tilt, technology development and organisational strategy among a range of other factors which serve as use cases to stifle future digitalisation efforts (Adie et al., 2022; Chong and Duan, 2020; Hartl and Hess, 2017; Horlacher and Hess, 2016; Li, 2020; Matt et al., 2016; Sebastian et al., 2017; Straub et al., 2021; Zimmer, 2019). However, in recent years, there has been a shift in how risk is viewed within the wider academic context with persistent contradiction between interdependent organisational elements often leading to tensions which can either lead to negative outcomes or be managed throughout the transformation to deliver value (Agarwal et al., 2022; Raza et al., 2019; Ortiz de Guinea and Raymond, 2020; Soh et al., 2019; Toutaoui et al., 2022). When exploring digital transformation risks in greater detail, the prevailing view of risk as an encompassing negative often gives way to two competing demands that although contradictory, must be addressed to deliver a successful transformation (Bharadwaj et al., 2013; Danneels and Vianne, 2022; Raza et al., 2019; Schad et al., 2016). Danneels and Vianne (2022) provide several examples of the paradoxes faced during digital transformation, with a number of them giving insight into the risks faced by organisations undertaking a major digitalisation such as needing to balance IT portfolio innovation with the requirement for IT stability and efficiency (Nwankpa and Datta, 2017). Conversely, Datta and Nwankpa (2021) outline the tensions faced by organisations when navigating macro challenges from the perspective of digital

transformation through striking a simultaneous balance between pursuing organisational continuinity and striving to achieve a competitive advantage in a post-Covid society. Digital transformation risks evidently have impacts on the internal and external features of the organisation as discussed by Toutaoui et al., (2022) who identify organisational tensions at various holistic levels such as cultivating digital talent while onboarding experienced employees for immediate success or managing identity clashes between personal digitalisation aspirations and more general occupational demands. Before tools or methodologies to manage the risks associated with digital transformation can be developed, the absence of a comprehensive list of digital transformation risks must be addressed.

3 Research Methodology

This research investigates the current state of digital transformation risk literature and seeks to conceptualise the previous failures of organisations in this area. In order to deliver a transparent and replicable study that systematically answers the research question, this study has adopted Chitu Okoli's (2015) approach to conducting systematic literature reviews, which is divided into four key phases: planning, selection, extraction and execution.

3.1 Planning

The first step of the planning phase was identifying the objective of the systematic literature review, namely, identifying the research question. In this case, the objective was to understand the causes of such high rates of failure in digital transformation engagements. The research question was therefore tailored to identify the risk factors that underpin digital transformation. This set a foundation upon which the research protocols were built (Opland et al., 2022).

3.2 Selection

In order to identify literature that would provide the most insight from top-tier outlets on the study's research questions, the team reached a consensus to target the Senior Scholars' Basket of Journals which in recent years have become the top outlets for digital transformation research. Additionally, two conferences (European Conference on Information Systems and International Conference on Information Systems) were chosen owing to the quantity of widely-cited socio-technical studies on digital transformation within the IS purview, outlined below in Table 1.

Research Outlet	Database	Initial Retrieved Texts
European Conference on Information Systems	AIS eLibrary	728
European Journal of Information Systems	EJIS Database (Taylor & Francis Online)	63
Information Systems Journal	ISJ Database (Wiley Online Library)	37
Information Systems Research	ISR Database (PubsOnLine)	42
International Conference on Information Systems	AIS eLibrary	408
Journal of the Association for Information Systems	AIS eLibrary	65
Journal of Information Technology	JIT Database (SAGE Journals)	52
Journal of Management Information Systems	JMIS Database (Taylor & Francis Online)	29
Journal of Strategic Information Systems	JSIS Database (Elsevier)	45
Management Information Systems Quarterly	AIS eLibrary	41

Table 1. Selected Research Outlets.

Following journal selection, search strings were developed to answer the research questions. Boolean operators were used to separate keywords which were in turn contained within double quotation marks (“”). Moreover, as different nomenclature can be used to describe various aspects of the transformation such as digital transformation, digitalisation or digitalization, the “*” was used to include all subtypes and categories of the concept (Collins et al., 2021; O’Brien et al., 2023). The search strings used to retrieve the sample of studies were: (i) “Navigating” AND “Digital*”, (ii) “Managing” AND “Digital*” and (iii) “Digital*” AND “Risk” (Opland et al., 2020). This search was undertaken by the first author on August 11, 2022 and validated by the team thereafter before initiating the first practical screening.

3.3 Extraction

Having acquired a bibliography of 1,510 research artefacts, the studies were exported to a spreadsheet in which a title-keyword-abstract search was conducted on artefacts between 2013-2023 in order to acquire a bibliography to gather insight on the research questions. Following this, the working bibliography decreased to 915 texts. Thereafter, inclusion and exclusion criteria were applied as per Kitchenham et al., (2009). To this effect, studies written in a language other than English were excluded. Moreover, duplicate studies were removed. If a study was initially published in ECIS or ICIS as a conference paper but were later published in one of the other outlets in Table 1 as a journal article, only the journal article would be included in the SLR. Furthermore, non-IS and non-peer reviewed articles were also excluded. With respect to inclusion criteria, only primary research studies were included, thereby excluding research agendas, SLRs, comprehensive literature reviews and editorials. This delivered a working bibliography of 166 texts which were selected for an in-depth review.

3.4 Execution

The studies were in turn divided and reviewed in depth. Studies were chosen if written in English and if they gave an account of the risks encountered during digital transformations. This did not mean that the study had to be address digital transformation risk outright, rather the review gathered a wide range of primary research studies like case studies, interviews, focus groups, action design research and surveys among others and identified certain aspects of their findings that explored risks, frictions, challenges or pain-points relating to the digital transformation and hence, the risks that emerged as a function of these and if relevant, the strategies used to address these risks. This required an in-depth critique of the studies which was conducted by the research team between August 15, 2022 to September 7, 2022. To this effect, the risks were tracked in a concept centric matrix whereby relationships and merges could be determined. Following several rounds of review, some risk domains were synthesised while others were separated. During the review, in a number of artefacts, the subject matter was too far removed from digital transformation risks and therefore provided little theoretical or empirical knowledge, thereby excluding them. Ultimately, a bibliography of 117 texts was used as the foundation for the literature review.

The SLR bibliography consisted entirely of primary studies, the majority of which being qualitative research. Case studies made up just under half of all texts and almost all of the qualitative research, reflecting a trend in digital transformation research (Vukšić et al., 2018; Whelan et al., 2023). Quantitative research made up just under a quarter of the bibliography, presenting a potential gap in digital transformation research. Analysis of the artefacts formed the basis of the study’s research findings.

4 Findings

This section outlines the findings from the review of the 117 primary research studies based upon the research questions. Possible themes were organised into meaningful clusters through the process of coding, a central approach to data reduction (O’Flaherty and Whalley, 2004). Miles and Huberman (1994) refer to these codes as “tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study” (p. 56). By implementing a coding strategy, the

researchers undertook a delimitation process whereby irrelevant, repetitive, or overlapping data was eliminated. Regularities and patterns, drawing explanations, re-checking data, and reviewing findings amongst third persons also formed part of this process as per Yin (1994). Content analysis was subsequently used to identify core themes across these research artefacts, as a means of ensuring consistency and regularity. The risks and sub-risk were mapped thereafter to visualise the relationship between risks across the literature findings as outlined in Figure 1. Risk findings have been outlined under the following sub-headings (i) Stakeholder (ii) Culture (iii) Organisation (iv) Strategy (v) Process and (vi) Technology.

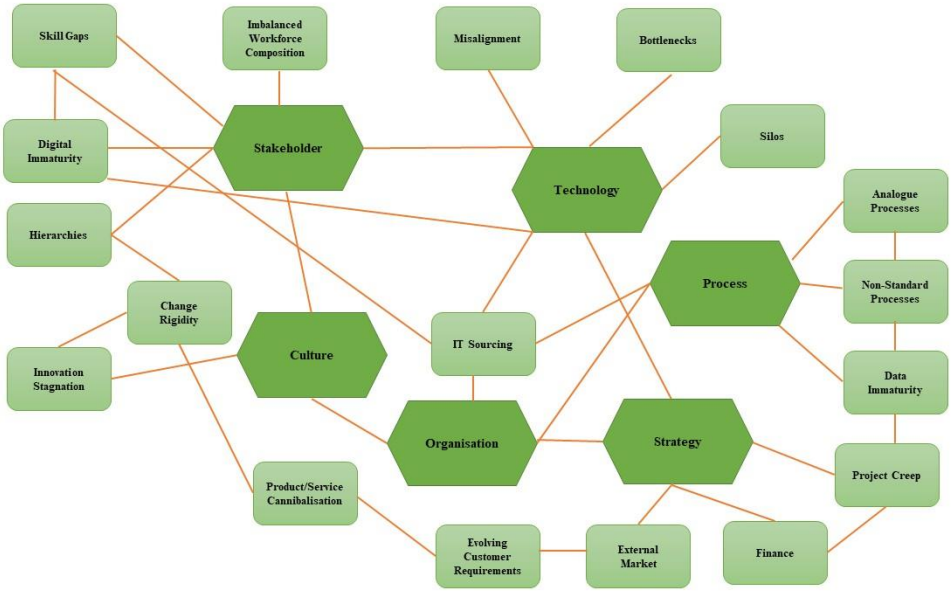

Figure 1: Digital Transformation Risk Thematic Map.

4.1 Stakeholder

Three main themes emerged from the perspective of stakeholders being a risk in a digital transformation project: imbalanced workforce composition, hierarchical management, and skill gaps. Soluk and Kammerlander (2021) present humans as the greatest barriers to digital transformation with the literature largely in consensus that inertia is one of the greatest risks to a successful transformation (Camposano et al., 2021; Knecht et al., 2022; Koch et al., 2021; Scott and Orlikowski, 2021). Digital transformation presents a major disruption to workforce composition which can lead to friction between an organisation's old staff and the new stakeholders oboarded to support the transformation (Baiyere et al., 2020; Frey et al., 2021; Lu et al., 2022; Weigel et al., 2020). This was exemplified in Wimelius et al., (2020) where a healthcare organisation introduced a new data management platform as part of a digital transformation but failed to align the existing employees which led to a workforce splinter of new employees who exclusively used the new platform and the old staff who continued to use the legacy platform. As such, it is crucial that during digital transformations, employees are aligned behind the transformation strategy and supported in using new technologies and digitalised processes (Bernardi and Exworthy, 2019; Li et al., 2017, Sandberg et al., 2020). One way in which it has been proposed that this risk is managed is through '*Digital Champions*' or '*Digital Advocates*' who are stakeholders within organisations who ensure that there is socio-technical alignment during digital transformations and that employees are incentivised to embrace the benefits of digital transformation as opposed to fearing the risks of change (Baiyere et al., 2020; Chanias et al., 2019; Gregory et al., 2018; Haffke et al., 2016; Hasan et al., 2020; Klopper et al., 2022; Weigel et al., 2020).

One of the key stakeholder risks that a Digital Champion would need to manage is stakeholder autonomy and how this would be impacted during a digital transformation (Serrano and Boudreau, 2014). The

literature outlines that a major source of risk lies in the see-saw balancing of control between traditional organisational hierarchies and a transformed workforce with digital transformation generally providing employees with greater control, agency and autonomy of their own responsibilities, workflows and processes than the traditional, paternalistic structures generally found in digitally immature organisations (Barthel et al., 2020; Bitzer et al., 2021; Hafezieh and Pollock, 2018; Goh and Arenas, 2019; Mikalsen et al., 2020; Nolte et al., 2020). However, digital transformation also poses a risk to stakeholders by requiring them to use new technologies or follow digitalised processes which may fall outside of their skillset or have little synergy with their role hitherto the transformation (Kappelman et al., 2019; Mandviwalla and Flanagan, 2021; Nolte et al., 2020). This can be seen in Wessel et al., (2020) in which sales staff were forced to transition from selling hardware to software with little guidance which resulted in an increased employee churn and a widening skill gap between pre-digital and post-transformation stakeholders. This skill gap in turn highlights another key digital transformation risk to be managed in order for employees to have the training and qualifications required to take proprietorship and control of their roles and responsibilities within the organisation during and after the transformation (Bilgeri et al., 2017; Chanias, 2017; Knop and Blohm, 201; Steinhauser et al., 2020).

The literature presents learning and development (L&D) as a key resource in this regard with easy access to training resources described as a key enabler of digital transformations by leveraging the risk of a developing skill gap as a catalyst to upskill and develop new capabilities to capture digital opportunities within the organisation (Bernardi and Exworthy, 2019; Fabian et al., 2020; Fuchs and Hess, 2018; Hellwig et al., 2021; Krumay et al., 2019). Additionally, a sophisticated knowledge management system to map digital processes and retain organisational knowledge after a stakeholder departs has been shown to be a resource to manage this risk in transforming organisations (Andersen and Ross, 2016; Mihailescu et al., 2015; Smajilovic and Feng, 2021; Trantopoulos et al, 2017). Finally, in order to align employees behind the digital transformation process, feedback has been presented as a key mechanism in capturing employee sentiment and optimising the digitalisation strategy to ensure a socio-technical fit across the organisation (Hartl and Hess, 2019; Klopper et al., 2022; Rahrovani, 2020; Reijnen et al., 2018; Svangren et al., 2021; Syed et al., 2021). The main risk outlined by Gregory et al., (2018) is ensuring that feedback is actually actioned by the organisation to enable future cooperation from stakeholders in order to enable continuous transformation (Klopper et al., 2022; Osmundsen et al., 2021; Zimmer et al., 2020). An aligned workforce has also been shown to optimise organisational culture during the transformation.

4.2 Culture

Another risk with respect to navigating a digital transformation is managing the organisational culture in order to enable and sustain digitalisation (Metzler and Muntermann, 2020; Mocker et al., 2020; Soluk and Kimmerlander, 2021). The literature identified three key subcultures which present the greatest risk during digital transformations: change rigidity, digital immaturity and innovation stagnation. With respect to a change rigid culture, the literature highlights how the aforementioned inertia must be managed to enable the organisation to adopt new digital technologies and digitalised processes (Nguyen et al., 2021). The literature places the onus to develop a change-capable culture on leadership with studies generally critical of paternalistic or hierarchical governance structures, preferring transformational leaders who enable social capital and incentivise transformation in their organisations (Barthel et al., 2021; Bergus and Back, 2017; Goh and Arenas, 2019; Hietala et al., 2021; Li et al., 2017). Weigel et al., (2020) present a transformational leader as a c-suite leader like the Chief Information Officer (CIO) or Chief Digital Officer (CDO) who enables their organisation to share their digital vision as part of a transformational strategy that aligns the organisation and provides the resources needed to develop a change-capable workforce. In contrast, Paavola et al., (2017) outline how middle management, as the intermediate position between staff and the c-suite can contribute invaluable insight on strategic developments during digital transformation while providing a crucial communication link across levels of the organisation and enabling skill development and alignment to the transformation strategy (Fabian et al., 2020; Meske. 2019). In any case, digital transformation presents an opportunity for leadership to manage and incubate digitalisation at a local level which is a core component in

managing the risks to culture seen during digital transformations (Datta and Nwankpa, 2017; Rossi et al., 2020; von Ohain, 2019). This highlights both a risk but also an opportunity for digital transformation.

The next sub-risk to be managed during a digital transformation is digital immaturity or a mistrust of embracing digital solutions (Soluk and Kimmerlander, 2021; Weingarth et al., 2020). This is particularly critical for digitally immature organisations with extensive manual processes (Baiyere et al., 2020; Wessel et al., 2020). Digital transformation introduces new technologies to disrupt broken organisational processes but there is also a risk that if stakeholders are not trained to embrace the new digital changes, either through a lack of training or misalignment with the transformation strategy, they will fail to be adopted within the organisation which results in the transformation failing (Scott and Orlikowsi, 2021). Aligning employees behind a digital-first mindset when engaging with processes is critical in managing digital culture risk during a transformation (Bengal and Haggerty, 2019; Munns et al., 2021; Zimmer et al., 2020). A digital culture will also assist in managing the final sub-risk which is an innovation culture (Luath et al., 2019; Mikhalsen et al., 2018; Piccinini et al., 2015; Raza et al., 2019).

A digital transformation is not a singular event, rather it requires continuous innovation and a shift away from a process oriented culture to an innovation culture (Li et al., 2017; von Ohain, 2019). As described by Smajilovic and Feng (2021), employees should be incentivised to foster an innovation culture that is accepting of developing new digital solutions and comfortable with agile development to enable long-term success (Berghaus and Beck, 2017; Chanias et al., 2019; Leonhardt et al., 2017). Such a culture is difficult to foster within a process-orientated or digitally immature organisation as each failed innovation can induce a hangover which suppresses future motivation or support to innovate (Grother et al., 2019; Haffke et al., 2016). Instead, Karimi and Walter (2015) suggest that employees should be given access to an innovation management platform along with flexible governance and support from senior management to develop business-focused digital solutions to sustain competitiveness (Ivarsson and Svahn, 2020; Mocker and Fonstas, 2017; Mocker and Novales, 2021, Stanske and Kautz, 2018). Although digital transformation introduces radical change to organisations, by providing employees with the opportunity to have input in innovating and pioneering new digital solutions, the risk can be managed to deliver success. In essence, the literature has presented culture as a risk but also an opportunity to be managed with respect to digital transformation from the perspective of change, digital-first and innovation. These culture risks have implications for the organisation at large.

4.3 Organisational

While transforming the organisation through digitalisation projects, three risks were highlighted by the extant literature as being vital to consider: product/service cannibalisation, evolving customer requirements, and an IT sourcing dependency. According to Lanamäki et al., (2020) a major risk in enabling a digital transformation for organisations is finding an equilibrium between the major 'revolutions' which encompass the periods of radical change such as introducing a new organisational platform with the 'evolutions' required to align the organisation with its transformation strategy over a longer period of time such as migrating a system to a cloud instance or upgrading to more sophisticated infrastructure (Gregory et al., 2018). As such, digital transformation is not a one-off event but a program of perpetual socio-technical change in the organisation (Munns et al., 2021; Nwankpa and Roumani, 2016). The first key risk in organisations undertaking a digital transformation refers to moving away from core products towards new digital services or customer offerings (Krumay et al., 2019; Soh et al., 2019). The main risk, as per Yeow et al., (2018) are new solutions, with no guarantee of success cannibalising existing products or services through the extensive resources and effort required during development. This is particularly prevalent among incumbent organisations with core customer offerings and little previous experience with strategically countering competition and this has been described in the literature as a major source of inertia and risk in transforming organisations (Hildebrandt et al., 2015; Munns et al., 2022; Oberländer et al., 2021). This risk often appears as a result of two other mutually exclusive but often interlinked risks. The first being the rise of disruptive actors and business models within an incumbent's domain (Baiyere et al., 2020; Li and Sun, 2019; Soluk and Kimmerlander,

2021). These disruptive and often digitally-native organisations generally offer new value drivers to the consumer such as cheaper costs, flexibility in service usage, an improved customer experience and other values, most notably seen through the disruption of the taxi industry by Uber (Frey et al., 2021; Ivarsson and Svahn, 2020; Lanamäki et al., 2020; Schirrmacher et al., 2019).

The other risk is market tilt and changing customer requirements such as the rise in digital ecosystems and payment strategies (Biedbach et al., 2021; Gimpel et al., 2020; Tan et al., 2020, Tana et al., 2019; Zapadhka et al., 2022). Karimi and Walter (2015) use the transition of news reporting from print to digital as a case study to reflect this. The change in markets, customer expectations and competition all present business model threats that when synthesised, create a risk to organisational digital transformations that poses a major source of friction for internal stakeholders with respect to introducing new digital offerings that may alienate existing customers or allow competitors to encroach on their market share (Anderson and Ross, 2016; Flengel et al., 2022; Ivarsson and Svahn, 2020; Soh et al., 2019). This risk in turn often forces organisations into major, revolutionary decisions regarding their digital strategy such as IT sourcing which in turn introduces the organisation to a new risk but also new opportunities (Lanamäki et al., 2020).

The major risks of outsourcing IT processes is a loss in flexibility and control with respect to how a process might integrate with an internally-managed solution in addition to the development of a major skill gap within the organisation if the process were ever to return to in-house management (Marx et al., 2021; Remane et al., 2017; Sandberg et al., 2020; Soluk and Kimmerlander, 2021). However, Lanamäki et al., (2020) outline a potential strategy for incumbent organisations to manage the risks associated with changing customer expectations, market conditions and external competition through strategic partnerships (Hönigsberg and Dinter, 2019). This can be seen in Piccinini et al., (2015) in which an automotive organisation's incumbent business model was no longer able to match customer requirements and disruption was posing a major threat. The organisation entered a strategic partnership with a digitally native competitor and by leveraging the competitor's digital infrastructure and agile mindset with the incumbent's market experience and resources, they were able to co-create a new value proposition for their customers (Mikalsen et al., 2018; Piccinini et al., 2015). This exemplifies how a risk can be managed to enable an opportunity for sustained development within the organisation.

4.4 Digital Transformation Strategy

From a strategic perspective, existing literature identifies scope creep, external market developments, and financial risks as being inherent to decision makers' considerations regarding digital transformation. One of the greatest risks in undertaking a digital transformation portfolio of work is developing consensus on which transformational activities to prioritise, the timeline of the transformation, the resources required and the governance structures of digital transformation among others (Mandviwalla and Flanagan, 2021; Schirrmacher et al., 2019). With so many activities, stakeholders and decisions underpinning a digital transformation, organisations often find themselves overwhelmed with options which can lead to complexity and scope creep, which according to Wang and Burton-Jones (2020), is a major risk to be managed (Barthel et al., 2021; Hartl and Hess, 2019; Syed et al., 2021). As such, the literature stresses the importance of ensuring that the organisational digital transformation strategy is defined and understood within the organisation (Camposano et al., 2021; Soluk and Kimmerlander, 2021). This has been proposed through the use of a widely circulated digital transformation roadmap which forms the basis of all digitisation projects within the organisation (Metzler and Muntermann, 2020; Sandberg et al., 2020; Soluk and Kimmerlander, 2021). This not only has the potential to mitigate the risk but also presents an opportunity to collect input and perspectives across the organisation for priorities concerning future digital strategies. In essence, the literature advises a transition away from short-term strategies, towards a long-term portfolio of digital transformation activities to enable a digitalised future state (Barthel et al., 2021; Mayer et al., 2018; Murawaski et al., 2019; Oestreicher-Singer and Zalmanson, 2013).

Further to maintaining a long-term strategy and avoiding scope creep, the literature suggests that governance of the overall transformation be coordinated at a c-suite level through a combination of

benchmarking progress against predetermined goals and key performance indicators (KPIs) (Chen et al., 2022; Mayer at al., 2018; Osmundsen et al., 2022). One risk that a long-term strategy generally fails to consider is how technologies, customer expectations and the industry at large develop externally to the transforming organisation (Barthel et al., 2021). The literature presents foresight management as a key mechanism to enable organisations to continuously evolve their digital transformation strategy (Anajeva et al., 2022; Bernardi and Exworthy, 2019; Chanias et al., 2019; Kriebel and Foege, 2021; Munns et al., 2022).

Finally, the literature has identified finance as a major risk to digital transformation strategy with budget creep presenting as great a risk as scope creep (Liere-Netheler et al., 2018; Onay et al., 2018; Rowland et al., 2017; Smajilovic and Feng, 2021). Organisations are often reluctant to allocate sufficient budgets for new digital solutions and transformational activities as the investment required often exceeds the cost of maintaining or extending the life of an existing solution, the latter being seen as a safer option in the short-term than investing in digital transformation which is not a clear profit centre or cost-saving measure (Anderson and Rossm 2016; Chen et al., 2022; Karimi and Walter, 2015; Li et al., 2017). This highlights a key organisational paradox which presents a risk underpinning digital transformation (Yeow and Soh, 2022). Bernardi and Exworthy (2019) outline how even digital solutions that are designed to reduce costs within a healthcare organisation struggled to receive funding as there was no guarantee of a return on investment. Budget creep also limits organisations' willingness to invest in digital transformation activities as maintaining existing solutions and technologies are more likely to remain within budget than an ambitious transformation portfolio (Koch et al., 2021). The mitigation strategy for the financial risk appears to be the development of a clear and aligned business case for each digitalisation activity in addition to regular benchmarking and review sessions to keep the transformation within scope and budget (Li et al., 2017; Mayer et al., 2018; Osmundsen et al., 2022). Such controls are intended to manage risk during digital transformation strategies, some can also be extended to manage process risk during digital transformations.

4.5 Process Transformation

When considering the processes being impacted by digital transformation, the extant literature highlights three key risks that play a fundamental role in its success or failure: manual workflows, non-standardised processes, and data immaturity. Processes have been shown to pose a major risk during digital transformation with process changes potentially adversely impacting an organisation's ability to service their customers or allow employees to carry out their roles while maintaining broken or manual processes also reduces the organisation's competitiveness, costs them financially and keeps their employees from pursuing innovation activities (Kappelman et al., 2019; Wessel et al., 2020; Yeow et al., 2018). Manual workflows have been described by Baiyere et al., (2020) as a major risk with respect to enabling organisational digital transformation. They provide an example of an organisation experiencing delays in onboarding and offboarding their employees as team managers were required to log tickets with IT weeks before the process was due which presented a bottleneck in their ability to expedite the workflow and manage their team (Baiyere et al., 2020). The literature advises that processes be standardised and documented across the organisation in order to accelerate workflows in addition to enabling employees to be onboarded quickly and retain knowledge after a team member departs (Lauterbach et al., 2020; Li et al., 2017; Osmundsen et al., 2022; Trantopoulos et al, 2017). Bemgal and Haggerty (2019) also caution that non-standardised processes can lead to silos developing or deepening within organisations which in turn may limit the impact that collaborative teams and cross-departmental digitalisation activities can have on the digital transformation strategy and the organisation as a whole (Horlacher, 2016).

The literature outlines several benefits of standardising processes including the ability to leverage data, feedback and analytics to inform decision-making with respect to process efficiency and the digital transformation strategy at large (Carroll et al., 2021c; Hietala et al., 2021; Mueller and Renken, 2017). This can feed into reporting suites and dashboards to benchmark digitalisation progress against the organisation's digital transformation strategy and roadmap in addition to enabling the dynamic

deployment of resources to manage risks as they arise (Chen et al., 2022; Gimpel et al., 2020; Rowland et al., 2022). Additionally, the leveraging of digital resources like IoT touchpoints and AI can be used to offer a new tool within the repertoire of transforming organisations to manage this risk (Eden et al., 2019; Koch et al., 2021; Soluk and Kimmerlander, 2021). Once processes have been standardised, the primary mechanism to manage process risk during digital transformations is to introduce intelligent automation, most notably through AI and RPA to alleviate stakeholders from having to undertake manual processes and enabling them to focus on digital transformation strategy and innovation as can be seen in Oberländer et al., (2021; Gregory et al., 2018; Raza et al., 2019). Therefore, although process transformation poses a critical risk that must be managed throughout the digital transformation lifecycle, it also presents an opportunity to optimise the way in which processes and operations are carried out within the organisation, which may not have been applicable before the digital transformation effort (Yeow et al., 2018).

4.6 Technology Transformation

Finally, when selecting the appropriate technology for a digital transformation solution, three risks emerged from the findings that were shown to impact on the success or failure of choice: technology bottlenecks, technology misalignment, and technology silos. Although not the only risk during a digital transformation, technology presents one of the foremost decisions and potential pain-points during a digital transformation which must be managed explicitly throughout the engagement lifecycle to enable success (Baiyere et al., 2020; Stockinger et al., 2021). The decision to migrate or upgrade existing technologies or digital customer service offerings poses a major risk to organisations but not as great a risk as maintaining legacy solutions in an increasingly digital market (Pettersen, 2020; Wimelius et al., 2020). As such, one of the core risks with respect to technology transformations lies in untangling the organisation from the socio-technical implications of maintaining a legacy technology that is obstructing operations and processes (Rossi et al., 2020; Sandberg, 2020; Schirmacher et al., 2019; Tan et al., 2020; Yeow et al., 2018). Wimelius et al., (2020) use a healthcare provider as an example of an organisation experiencing siloes and bottlenecks as a result of the technical limitations of their data management platform and infrastructure such as data duplication, limited flexibility in terms of upgrading the technology or digitalising the processes in addition to the impacts of vendor lock-in, these risks being analogous to the other case studies in the literature (Anderson and Ross, 2016; Baiyere et al., 2020; Bygstad and Hanseth, 2018; Camposano et al., 2021; Metzler and Muntermann, 2020; Datta and Nwankpa, 2017; Rowland et al., 2022; Zapadhka et al., 2022).

Although undertaking a major technology transformation as part of a digital transformation portfolio of work is a major risk, it is crucial that organisations ensure that their technology estate has the maturity to fulfil its intended business capabilities (Hartl and Hess, 2022; Marx et al., 2021; Osmundsen et al., 2022; Remane et al., 2017; Rossmann, 2018; Thordsen and Bick, 2020). Having the most advanced digital resources is not the only consideration in managing technology risk during digital transformation, as previously discussed, a successful digital transformation requires a holistic management of all underlying risks and success factors (Li et al., 2017; Mandviwalla and Flanagan, 2021; Tana and Breidbach, 2021). However, as discussed by Hildebrandt et al., (2015), an organisation's survival is often based around the need to create new digital pathways and their ability to adapt to new external technologies. Therefore, although adoption of disruptive technologies is not a guaranteed risk mitigation strategy for organisations, in fact, they can be considered to be risks onto themselves if not implemented correctly, case studies outline how the adoption of disruptive technologies within organisations can often enable digital transformation (Eden et al., 2019; Hietala et al., 2021; Mocker and Ross; 2018; Riasanow et al., 2017). Following the introduction of new technologies within the organisation, it is critical that they be embedded within the business units, thereby realigning technologies as an organisational resource and responsibility as opposed to solely within the purview of the IT unit (Anderson and Ross, 2016; Koch et al., 2021; Onay et al., 2018). As such, digital resources can be leveraged to enable digital transformation, thereby mitigating the risks that organisations face with respect to technology.

5 Discussion and Future Research

With regards to answering the research question set out in Section 1, the systematic review of the literature has identified that there are several socio-technical factors that present risks to organisations undertaking digital transformations. These risks provide several implications to the digital transformation body of knowledge while also setting foundations upon which future research can be conducted as outlined herein.

5.1 Digital Transformation Risk

This review has challenged the current understanding of digital transformation risk within IS research through introducing a paradoxical logic lens to the concept, enabling risk to be viewed as both vicious and virtuous, its impact on the transformation being shaped by how it is addressed and managed by the organisation (Pradies et al., 2020; Smith et al., 2017). From the literature, there were numerous examples of when a risk was ignored or not managed correctly which resulted in vicious outcomes for the transformation such as the healthcare organisation in Section 4.1, that did not align its staff behind the new data management platform, resulting in the organisation using two different platforms for a similar function (Wimelius et al., 2020). Conversely, in 4.3, the incumbent automotive company responded to the risk presented by disruptive actors encroaching on their market share in a virtuous way through entering a strategic partnership with a disruptive rival to leverage each other's strengths and mitigate each other's weaknesses (Piccinini et al., 2015). There is a need for more cross-discipline research on how paradoxical risks can be managed to enable more virtuous outcomes as is currently being documented within organisational studies, change management and innovation research (Jonathan et al., 2018; Pradies et al., 2020). Through embedding this view of risk within the organisation, strategies can be developed to manage risk during digital transformation.

5.2 Digital Transformation Risk Management Strategies

The review findings have identified a number of socio-technical risks emerging from overarching threats relating to digital transformation that must be managed to enable success. The findings have presented a risk as something that must be identified, monitored and evaluated throughout an organisation's digital transformation portfolio lifecycle, to guide projects in implementing transformational activities, aligned behind the organisation's digital transformation strategy and vision in addition to providing lessons learned for future projects (Casey and Souvignet, 2020; Correani et al., 2020; Hess et al., 2016; Lim et al., 2011; Matt et al., 2016). At present, organisations do not have a framework or artefact to enable them to explicitly manage risks and navigate their digital transformation. This is in spite of calls for a risk management framework within the academy (Menzefricke et al., 2021; Yucel, 2018). Such a framework would likely need to be a dynamic, living artefact that is embedded within the project and programme management toolset along with other foundational artefacts like Risk Assumption, Issues & Dependencies assessments (RAIDs) or Weekly Status Reports (WSRs). In this regard, the digital transformation team would be able to map a digital transformation risk throughout the project lifecycle to increase the likelihood of success. Such a framework, if implemented, has the potential to increase the likelihood of digital transformation success by providing an aligned vision of risks to observe and manage during digitalisation activities.

5.3 Embedding Digital Transformation Risk Management

As discussed in the review, digital transformation is more than solely the implementation of technology, it is a holistic transformation of the organisation through the medium of technology (Vial, 2019). Although this view is understood within the academic literature, in practice, the majority of transformations solely focus on the technical aspects which can result in a higher rate of transformation failure (Carroll, 2020; Lanamäki et al., 2020; Oberländer et al., 2021). There is a requirement for further research to understand how the holistic aspects of a transformation can be managed to embed the

transformation within the organisation and ensure that digitalisation activities are aligned behind the organisation's digital strategy and vision (Kurti et al., 2021). Mann et al., (2022) discuss how external business system actors can be orchestrated to assist with fulfilling certain transformation activities and by ensuring a fit between between the capabilities required and the ecosystem actor, certain digital transformation activites can be fulfilled or developed which in turn could mitigate risk. This ties into Brosnan (2022) and a hypothetical 'digital transformation as a service' in which the holistic aspects of a digital transformation are managed by external actors like consultants or managed service providers which could hypothetically offload digital transformation risk from internal stakeholders within transforming organisations. Regardless, it is critical that further research is conducted to identify mechanisms to embed the holistic aspects of the transformation within the organisation, to make transformational activities appear to be 'business as usual' as opposed to a major revolution to the *status quo* in order to maximise the likelihood of a successful transformation.

6 Conclusion

6.1 Implications

The primary contribution of this research from an academic perspective was identifying six key areas of risk relating to digital transformation, based upon the prevailing perspectives within top-tier IS research. It is envisioned that these risks will form a basis for future research in enabling organisations to navigate their digital transformation. Additionally, the research has introduced a new perspective of risk to IS discourse through presenting it as an uncertain event with the potential for vicious or virtuous outcomes depending on how it is managed. Therefore, future research on digital transformation risk should be directed towards leveraging risks to enable success as opposed to solely viewing it as a challenge to be overcome. Furthermore, this study has identified areas that would benefit from future research such as the paradoxical nature of digital transformation risk, risk management frameworks and embedding the socio-technical factors of digital transformation within organisations to enable them to manage these risks. Hence, digital transformation should be normalised within academic discourse as something to be managed to enable virtuous outcomes as opposed to addressed to avoid vicious ones. Moreover, with respect to the industry implications of this research, it is intended that with a comprehensive outline of the risks that impact digital transformation, organisations will be capable of identifying, monitoring and evaluating risks as they arise from a project and programme management perspective. Future research should develop a framework to enable this process under a more formalised methodology with the intention of reducing the aforementioned digital transformation failure rate (Chanias et al., 2019). Additionally, with a number of best practices outlined throughout the review of how these risks were managed during digital transformation case studies, organisations will be better equipped to engage with these risks as they arise.

6.2 Limitations

As is true with any research, this study has several limitations. The primary being limiting the scope to only 10 research outlets within the IS field, albeit these outlets are widely renowned as among the top journals and conferences for digital transformation research. However, by excluding other outlets within the IS field, the research may not reflect the advances pioneered within the IS discipline as a whole. Moreover, the research acknowledges that by disregarding certain fields like managagement science and organisational studies, the extensive contributions of previous research into areas like paradoxical logic, organisational tension and risk may not have been reflected in the review's findings. Regardless, future research would likely benefit from expanding the scope of research outlets and disciplines. Additionally, the review only included primary research studies in its analysis of 117 research artefacts. Although the original intention to only focus on perspectives and experiences from organisations and individuals who have undertaken digital transformations is still justified, future research may benefit from a wider purview of research types such as literature reviews, research agendas and review articles.

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