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Digital Transformation and Risk Management for SMEs: A Systematic Review on Available Evidence

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Abstract: Small and medium enterprises (SMEs) are acknowledged as key drivers to economic growth and social development worldwide. Digitalization brings opportunities as well as challenges to SMEs. Therefore, it is of great significant for SMEs to identify, assess and manage potential risks in digitalization. This study aimed to provide a systematic literature review (SLR) of available research evidence on risk management in SMEs under the digital transformation. Through SLR, a search on Web of Science (WOS) as well as Scopus resulted in the acceptance of 67 peer-reviewed papers published from 2017 to 2023. The results showed that SMEs are mainly concerned with covid-19 crises and supply chain risks, technological and security risks and organizational risks. By adopting various methods to testify risks, management strategies such as strengthening organizational learning, technological and resilient capabilities, implementing cybersecurity governance and IR compliance, adopting safety management tools, participating public support and initiating educational training courses are suggested for SMEs to achieve a successful digital transformation. This research may help researchers as well as practitioners deepen their knowledge in SMEs' risk management under digitalization.

Keywords: Digital Transformation, Small and Medium Enterprises, Risk Management, Systematic Literature Review

1. Introduction

Small and medium enterprises (SMEs) are acknowledged as key drivers to economic growth and social development worldwide, which contribute to more than 50% of taxes, 60% of the GDP, 70% of technology innovation and 80% of all the employment in downtown areas [1][2][3]. SMEs have inherent characteristics that differentiate them from larger enterprises, such as more flexibility in response to changes and more specialized in their capabilities [4][5][6].

Digital transformation blurs the boundaries across industries, brings strategic and organizational changes and challenges enterprises' competitiveness [7][8][9]. Due to inadequate internal and external resources, limited access to external knowledge and unclear innovation strategies compared to larger companies, many SMEs have encountered barriers in digitalization from technical, technological, organizational and legal aspects [10][11][12]. Meanwhile, the ever-changing business environment after covid-19 crisis threatens the sustainable performance of SMEs, which enforces them to adopt digital technology to compete and stay alive [13]. This suggests the survival of SMEs would be challenged without much attention to potential risks in an evolving technological era.

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Risk management has been one of the major approaches for SMEs to deal with uncertainty and achieve operational success [14][15][16]. In comparison with large enterprises, SMEs with scant resources have faced more difficulties when it comes to risk management. The methods to manage risks vary from larger companies to small companies [17], as a result, SMEs should adopt suitable risk management strategies in line with their own characteristics. Although previous study already built up risk management strategies for SMEs as a whole [14], it still lacks understanding of the corresponding risk management strategies especially under the digital transformation background. Therefore, this research provides answers to the following two questions. Firstly, what are the typical types of risks for SMEs under digital transformation? Secondly, how can SMEs manage each particular types of risks under digitalization?

This paper complements the research related to digital transformation for SMEs. While previous studies showed that covid-19 crises have accelerated the uptake of advanced digital technology for SMEs [18][19][20], it still lacked understanding of how SMEs managed the potential risks when facing economic and social disruptions. Contrary to most of studies which only analyzed certain types of risks and came up with corresponding management strategies, this paper provided an integrated framework for SMEs' digital transformation and risk management strategies. To the author's best knowledge, this is the first systematic literature review essay with a combination of digital transformation, SMEs and risk management. This research is aimed at helping researchers as well as practitioners deepen their knowledge in SMEs' risk management.

2. Research Methodology

This paper adopts the basic guidelines for systematic literature review (SLR) set out by Tranfield in business and management areas, which follow the general process of planning, conducting and reporting related literature [21]. It allows the researcher to perform the mapping and evaluation of existing knowledge on the subject researched and provides conditions for a consistent definition of the research question that is being researched, helping to define the research gap more consistently. The author designs the research based on the steps below.

2.1. Step one: Identification of the research topic and gap

Since the research focuses on development and the state of the art of risk management in SMEs under the digital transformation, the author presents the research gap by exploring literature related to digital transformation, SMEs and risk management (as depicted in Figure 1).

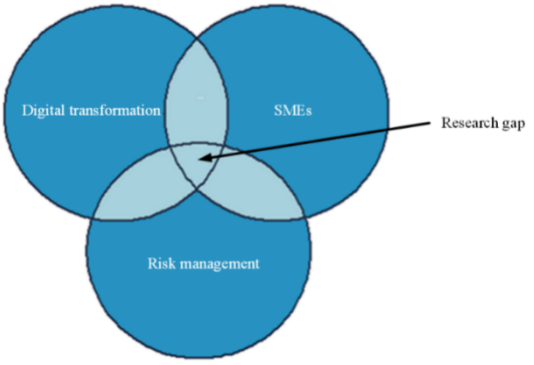

Figure 1: Research Gap at the intersection of digital transformation, SMEs and risk management

In this context, it is necessary to clarify definitions of key words, which are as follows:

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Digital transformation can be viewed as an organizational transformation process for SMEs due to investing or adopting advanced technology [22]. For instance, SMEs would adopt digital technology in functional activities such as engineering, marketing and supply chain, developing digital service or products, using apps, platform to connect with customers, and redesigning business model based on advanced technology.

SMEs, which are this paper's research objectives, can be understood as an organization structure compared to large enterprises, since there is no globally standardized definition of the term.

Risk management is identifying, analyzing and controlling risks according to generic guidelines and principles provided in ISO 31000 (2018) [23]. Based on this definition, risk management can be interpreted as a systematic process that helps enterprise to understand what are the risks in operation management and adopt corresponding actions in response to risks.

2.2. Step two: Searching key words

The key words are implicit to three underpinning concepts, namely: digital transformation, SMEs and risk management. The term of 'digital transformation', 'digitalization' and 'digitization' are often used interchangeably in existing literature [24][25][26], so this paper includes a combination of those three key words representing digitalization. Similar to the previous reviewed papers [1][2][4], the research expanded 'SMEs' into 'small and medium enterprises', 'small and medium-sized enterprises', 'small and medium companies', 'small and medium-sized companies', 'small and medium businesses' and 'small and medium-sized businesses', and searched for related papers. Since this paper focuses on the actual process of risk management, the author implements the following search phrase based on browsing related literature and typed the keywords such as risk factors, risk determinants, disturbance, business risk, risk management, strategic risk management, project risk management and manage risk.

2.3. Step three: Screening

The databases Scopus and Web of Science (WOS) were selected because they have been acknowledged as the most comprehensive multidisciplinary bibliographic databases worldwide [27]. Moreover, using these databases ensures that any paper retrieved would satisfy four of the quality measure's criteria, including CiteScore, source normalized impact per paper, h-index and SCImago journal rank [28]. The WOS and Scopus search with the selected keywords from 2017 to 2023 resulted in 307 documents. Reduction in data was carried out with an additional filter of capturing data from published works in peer-review journal articles in English language only, yielding 162 documents.

2.4. Step four: Assessment of exclusion and inclusion

The articles' selection considered the following filters:

Elimination of duplicates

Reading of title, abstract, and keywords

Reading of the full text

Meanwhile, the use of EndNote software facilitated the organization of the retrieved papers. The output of documents had to reflect the research objectives, therefore, the author discarded papers that is irrelevant to the research topic. This research is intended to provide an overview of risk management for SMEs under digitalization, so the author selected literature that combine digital transformation, SMEs and risk management topics, which differentiate most of the earlier research. After initial and further screening, 67 papers were left for qualitative synthesis.

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SLR was proposed in the PRISMA Statement Flow Diagram as a summary of article selection [28]. In order to better describe the process of SLR, the profile in Figure 2 is drawn.

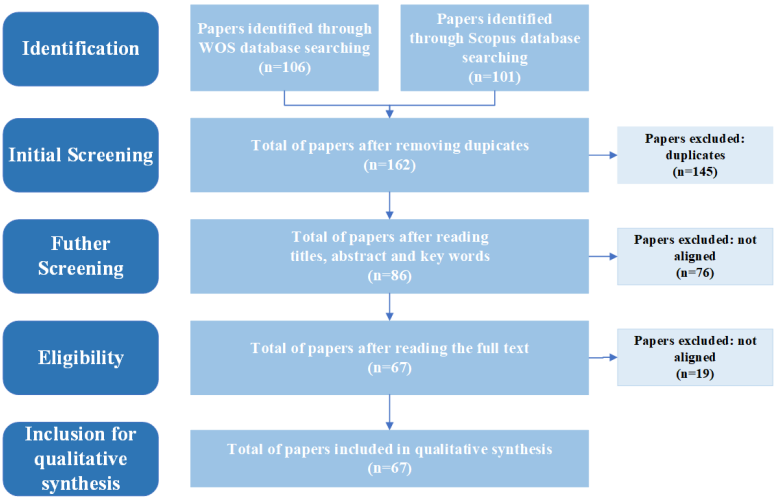

Figure 2: PRISMA Statement Flow Diagram

3. Results

Through SLR process, 67 papers were chosen to describe the intersections of digital transformation, SMEs and risk management. We first analyze those selected papers using descriptive methods in order to get a whole picture of the latest trend in this research area. Then an in-depth analysis of those reviewed papers was conducted to answer our research questions. Finally, an integrated framework was built up as a conclusion for this part.

3.1. Descriptive analysis

The profile in Figure 3 clearly indicates that the subject area of interest is quite new, relevant and offers scope for research. In fact, the area has undergone major growth since 2017 (N =1) to 2023 (N =14), which highlights the emerging nature of the research area.

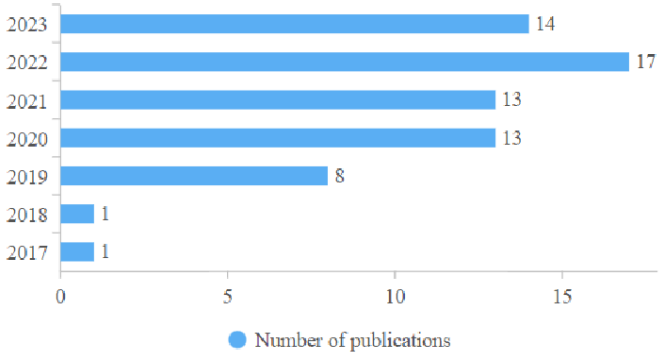

Figure 3: Number of publications published each year from 2017 to 2023

Among all the selected literature, about 73% of them adopted quantitative methods, such as simulation and modelling, questionnaires and surveys, ect. As can be seen in Figure 4, about 27% of the studies used qualitative methods, such as building conceptual models and framework, literature

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review on certain topics (eg: digital transformation and innovation). The results indicate the possibilities and necessities of using SLR methods to implement the research, for a better understanding of the intersection of the research areas.

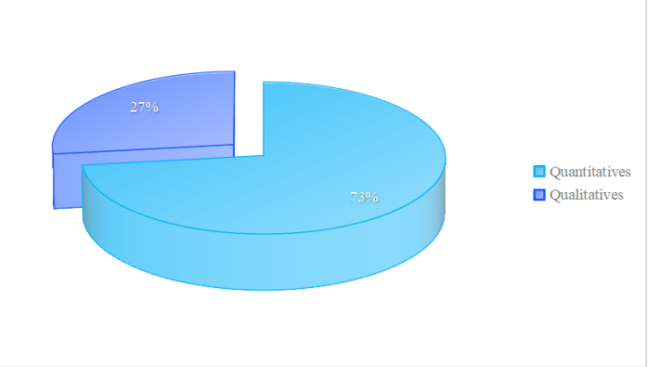

Figure 4: Percentage of different research types from the selected papers

3.2. Content Analysis

Based on the research questions, attempts were made to focus the SLR synthesis and identify content or articles that best describe the defined areas and supporting theoretical concepts. In-depth analysis of types of risks and corresponding management strategies are described as below.

3.2.1. Different types of risks

According to the reviewed literature, SMEs faced both external and internal risks in digitalization [18][29][30]. The author mainly analyzed and elaborated the typical risks types in this section, and answered the question of what the typical types of risks for SMEs under digital transformation are.

First are the covid-19 crises and supply chain risks. Research indicated that covid-19 outbreak had an adverse effect on business continuity [31][32][33][34]. SMEs were prone to suffer in such conditions because of their vulnerability to the rapid changes of surrounding macro-environment [35]. As a result, it is crucial to adopt digital transformation strategies to cope with pandemic's operational and supply chain disruptions [36][37][38]. Previous study showed that the covid-19 crises were considered as the main drivers for SMEs to shift their business from offline physical stores to online stores due to the lock down cases [39]. Some also highlighted the importance of digital transformation to mitigate supply chain risks and achieve resilience [39][40][41]. However, strategies such as being accessed the open innovation network through digitalization may jeopardize SMEs' survival [42]. Problems such as loss of bargaining power over suppliers, unstable partnerships in coordination, loss of competitive advantages in competition would highly occur by being exposed themselves to more uncertain global economic markets [43].

Second are the technological and security risks. Research regarded the adoption of advanced technology as a potential type of risk for SMEs due to the possibility of transformation failure as well as leak of data information and cyber security issues [44]. Previous study claimed that 89% of SMEs are in the exploration stage of digital transformation, 8% of SMEs are in the practice stage of digital transformation, and only 3% of SMEs are in the deep applied stage of digital transformation [42]. This is mainly because the technical complexity arises in adjusting existing ERP systems to be compatible with the advanced technology and to achieve a high level of automation [45][46][47]. The combination of complexity of technologies, cyber-space and outsourcing in many business activities may increase hazard problems and lead to failure in operation [48]. In addition to business risks arising from digital transformation failure, studies showed that SMEs have always been struggling

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with cyberattacks and leak of confidential information issues [49]. Therefore, it is of significance to implement data privacy governance, establish IT risk management framework and develop security environment for SMEs to achieve successful digital transformation [50][51][52].

Third are the organizational risks. Research mainly pointed out potential risks for SMEs in digital transformation from organizational perspectives. SMEs are facing innovation risks with the adoption of digital technology [45], and they have to assess their dynamic digital innovation capabilities in order to mitigate perceived risks and realize successful business model innovation [53]. Meanwhile, the lack of digital skills and talents, as well as digital culture could risk SMEs' competitiveness if they fail to embrace digitalization [54]. Besides, SMEs would find it more difficult to perform digital transformation strategies without enough political and financial support as well as commitment from the top management and government officials [55]. They hope to balance the tradeoff between digital transformation investment and profits margin under financial constraints, and they are struggling to make the right decisions about when and how to invest proper digital technologies [56][57][58][59].

3.2.2. Risk management strategies

Effective risk management strategies are of great significance for SMEs to cope with potential risks in digitalization. The author primarily answered the questions of how can SMEs manage each particular types of risks under digitalization by presenting methods and actions from the reviewed literature in this section.

First are methods to assess risks. Several methods were proposed in previous research to measure potential risks for SMEs in the process of digital transformation for operational success. One of the most common ways is to directly evaluate risks in adoption of digital technology. In order to get a better understanding of what are the crucial factors that influence SMEs to implement digital transformation strategies, researchers adopted the fuzzy-analytical hierarchy process to identify and prioritize the critical risks connected to digitalization [60], which helped enterprises optimize process planning and support decision making [43]. SWOT analysis have also been conducted to define risk factors closely related to SMEs' objective functions [61][62][63]. An integrated framework created by PDCA cycle enabled SMEs to minimize operational risks and achieve high quality management [48]. Since selecting the wrong technology could be a risk for sustainable development, the effects of digital technology adoption on KPI for SMEs should be examined in the operational process [51]. In addition, by assessing level of willingness, capabilities as well as digital maturity to embrace advanced technology, it could allow SMEs to forecast upcoming risks, be fully prepared for digital transformation and achieve digital business value [53].

Second are actions for coping with risks. Research highlighted the significance of strengthening enterprises' organizational learning competence, technological competence and resilient competence in dealing with multiple risks. Organizational learning capabilities, particularly absorptive abilities and learning intent, has been acknowledged as one of the most important drivers in digital transformation [39], since it would allow SMEs acquire external knowledge of technical skills in managing digital resources through supply chain open innovation [64]. Especially under the post-pandemic era, adopting flexibility, coordination and visibility practices to enhance supply chain resilience would be crucial for SMEs to achieve successful digital transformation [55].

In terms of handling risks related to technological advancement, it is necessary for SMEs to assess their current states of cybersecurity maturity in order to better implement and manage security practices associated with technical assets and digital operational environment [65]. Research also emphasized the important role of cybersecurity governance and IT compliance, mapping cyber security standards into governance guidelines [66]. Despite the side effects of digitalization for SMEs, studies suggested that SMEs could fully take advantage of advanced technology and information communication systems as useful tools to implement safety management [67]. Technologies such as

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cloud computing would be a solution for secure communication and collaboration for SMEs' decision making [68]. The adoption of Information Security Management System (ISMS) would mitigate operational risks by ensuring the confidentiality, integrity, and availability of business information and business continuity [50].

Studies identified the necessary public support measures for SMEs based on their actual sizes and digital willingness, including financial funds and tax incentives, as for providing policy makers with guidance on how to facilitate a successful digital transformation [69]. Developing educational training courses with multidisciplinary approaches, wide range of topics, as well as hybrid learning strategies should be considered for decision makers, in order to raise awareness of concerning digital technologies potential and implications for employees, and to create a digital culture through organizations [70].

3.3. An integrated framework for content analysis

In this section, the author drew the conceptual diagram in Figure 5 to depict the logic of identified primitives with their defining attributes. This integrated framework was built as a conclusion for the content analysis from the reviewed literature.

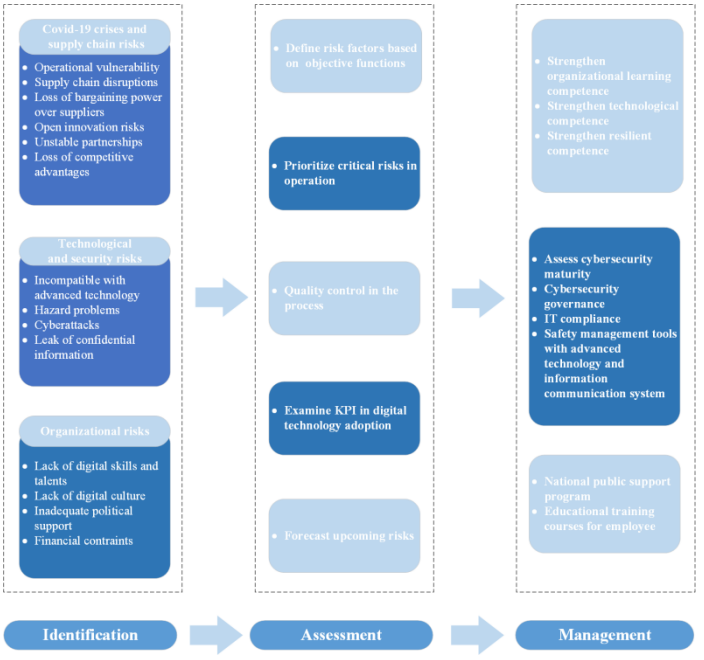

Figure 5: An integrated framework for content analysis

4. Conclusions

The main goal of this research is to provide available evidence for SMEs to identify, assess and manage risks under digitalization. SLR method was adopted to analyze the research topic of digital transformation, risk management and SMEs. Results showed that, 1) covid-19 crises and supply chain risks, technological and security risks and organizational risks are what SMEs mostly concerned about under digitalization; 2) Various assessment methods have been developed to deal with certain types of risks; 3) SMEs could handle potential risks through strengthening organizational learning, technological and resilient capabilities, implementing cybersecurity governance and IR compliance, adopting safety management tools, participating public support and initiating educational training courses. It is found that the intersection of digital transformation, risk management and SMEs would

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be an emerging research area. Further studies with empirical methods would be suggested for in-depth analysis of digital transformation and risk management for SMEs in different industries.

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