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Applying Systematic Literature Review and Delphi Methods to Explore Digital Transformation Key Success Factors

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Abstract**—**Digital transformation is about identifying the necessary changes of the entire business model, rethinking how to transform the traditional operations into digital ones that can create better value to its customers. Efforts are common across industries, but they often fail due to a lack of understanding of the factors required to focus on and change to be able to embark in digital transformation successfully. Further research is required to bridge the knowledge gap between academia and industry to support companies starting their digital transformation journey. To date there is no consensus on digital transformation key success factors. Therefore, the aim of this paper is to identify the success factors in digital transformation journey, throughout conducting a systematic literature review of 134 peer-reviewed articles to get better insights regarding the research progress in this field. After completing the systematic literature review it will be followed by Delphi study to get experts consensus on the most significant factors affecting digital transformation implementation. The findings indicate that organizations undergoing digital transformation should focus mainly on (1) well managed digital transformation activities; (2) digital business strategy; (3) supportive culture; (4) top management support; (5) organizational change capabilities.

Keywords**—**Digital transformation, key success factors, literature review, Delphi study.

I. Introduction

THE digital revolution is one of the biggest developments affecting industry nowadays [1]. Many businesses embrace digital transformation as a way of achieving competitiveness, promoting value growth, and developing new consumer experiences to deliver better services in today's hypercompetitive market [2]. Several scholars attempt to describe the word "digital transformation," but there are differing perspectives about what digital transformation actually entails [3]. Digital transformation is described from a business standpoint as "the use of emerging digital technology to allow significant business changes in customer experience, operations performance, and business models" [4]. Furthermore, previous research has found that effective digital transformation is more of change in core organizational elements rather than of technology [5], [6]. Nearly 70% of recorded organizational digital transformation activities fail to fulfil the organization's goals or the timeline for the transformation or both [7]. The high failure rate of digital transformation initiatives in organizations highlights the need for further research in this area [7], [8]. Furthermore, many authors claim that the main cause of digital transformation failure is the organizations' inability to recognize the key success factors for digital transformation. It is acknowledged that until now there is a clear gap of knowledge in identifying the most significant factors for successful digital transformation [9]-[11]. Further research attempts to define key success factors that are required to enable businesses improve their digital capabilities and assist practitioners in their digital transformation journey [12], [13]. Hence, the objective of this paper is to investigate the literature on digital transformation studies to identify the progress of research in identifying the critical success factors that should be explored and managed to ensure successful digital transformation initiatives.

The remainder of the paper is organized as follows. First, a brief overview about digital transformation is discussed. Second, the research methodological approach is examined. The paper will finally end up with concluding remarks about the findings related to the final agreed key success factors for digital transformation.

II. Digital Transformation Overview

Organizational capabilities, routines, processes, and systems are all being challenged by the new emerging technologies [14]. The implementation of Big Data Analytics, Internet of Things (IoT), Artificial Intelligence (AI), the fifth generation technology (5G), Blockchain, and digital platforms require urgent changes in traditional organizational competencies and skills [15]. The annual rise in global spending on information technology demonstrates the growing importance of digital transformation [16].

The word "digital" refers to the transformation that happens in today's world as a result of emerging technology adoption. The word "transformation" refers to how modern technology not only supports conventional approaches but also allows for new forms of innovation in a given domain [17].

Overall, digital transformation can be described as the process of applying innovation over time to enable major business changes that eventually result in the transformation of a company or industry [10]. From a business standpoint, digital transformation is defined as "fundamentally changing traditional ways of doing business" [18]. Whilst, from a firm

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point, digital transformation is defined as "the firm formulated and executed strategy through leveraging digital assets to create unique value" [19].

Previous research pinpoints that digital transformation has social and economic disruptions and it is not simply about acquiring new technologies [20]. Although technology is considered a critical element in digital transformation, it is recognized that digital transformation is not only about using digital technology but rather a holistic approach for organizational change [2], [21]. Thus, it is argued that digital transformation is about doing improvements to core business elements such as strategy, business models, business processes, organizational structures, customer experience and culture [22]. As a result, digital transformation is distinguished from other technical innovations by its new human-machine interactions effects [23].

There is a considerable amount of research done on the maturity assessment of digital transformations, still there is a shortage in research identifying the most significant success factors affecting digital transformation success to support companies navigating such digital change [24], [13], [19], [11]. By scanning the literature, several attempts to discuss the success factors that affect digital transformation were identified. Some authors claim that supportive and agile corporate culture, which refers to the organization's willingness to work, act, restructure and to be flexible and adaptable in order to react to change, is considered as key success factors for digital transformation [25]. Other researchers indicate that well-managed transition initiatives through human capital commitment, education, and training, employees readiness for digital change can be considered among the important key success factors in the digital transformation journey [13], [26]. Additionally, numerous studies have extensively highlighted that change management can be seen as the driving factor for digital transformation success. In line with this thinking, it is argued that management support will play a crucial role by continuously allocating sufficient budgeting of resources as time and money which will consequently affect the digital transformation success journey [25]-[27].

Yet, several studies have pointed out [28], [29] the importance of having a digital business strategy that is primarily built upon the fusion of information systems (IS) strategy and business strategy. A successful digital business strategy is formulated and executed by leveraging the organizations' digital resources to create a differential value. Furthermore, organizations should actively pursue appropriate dynamic capabilities through sensing, seizing, and transforming their business environment. Scholars [29] argue that organizations can develop core competencies by continuously leveraging their collaboration within digital ecosystem partners and leveraging their internal and external knowledge. Findings confirm that both factors are vital for successful digital transformation. As a result of having an in-depth understanding of the above-mentioned factors, organizations will be able to innovate their value propositions, create digital products and services; personalize their customers' experiences; increase profits, and create revenue sharing [10], [29], [30].

III. Research Methodology

The methodology adopted for this paper consists of conducting a systematic literature review method adopting a bibliometric and content analysis approach in order to search and select relevant articles; then analyzing and classifying themes extracted from literature and discussed as digital transformation factors in the literature [31]. Finally, to reach an agreement upon the key success factors, the Delphi method was used to get experts opinions, refine the list extracted from the literature and rank the key success factors.

A. Systematic Literature Search and Analysis

It would be difficult to achieve the required organization success without understanding digital transformation success factors [32]. Therefore, to successfully carry out digital transformation initiatives, there is a need to establish a list with key success factors required [10]. A success factor is described as "those factors that must go well in order for a company to succeed; they reflect managerial or firm areas that need special attention" [33]. Hence, the main objective of this paper is to explore and identify critical success factors, those of which are essential organizational elements that allow the success of the digital transformation [3], [34]. In order to achieve the objective, the systematic literature method for identifying, evaluating and synthesizing the existing work produced by researchers, scholars, and practitioners included: (1) searching the literature through Web of Science (WoS) database; (2) specifying the inclusion and/or exclusion criteria such as search strings, research areas, papers' types and timespan to select the papers included in the study; (3) analyzing the papers using content analysis software WordStat 8.0 to examine and identify repeated patterns, concepts and distinct features in the papers examined. Thus, from the systematic literature review we will be able to extract and cluster common topics, themes and trends related to digital transformation success factors in order to prepare for the next stage which is introducing those outputs to the Delphi expert panel [35], [36].

Papers selected were not limited to specific research area, time period, or location. Additionally, the inclusion criteria consisted of selecting only English journal articles, review papers, conference proceedings, and book chapters. The literature search inclusion criteria are declared in Table I. The literature search was run in April 2021, the initial search using "Digital Transformation" and "Digitalization" topics before refining the results based on inclusion criteria mentioned above resulted in 166 papers in total. The results were refined based on language/type and were reduced to 134 papers that were adequately corresponding to the researched topic.

87.2% of the total number of papers consists of journal articles and early access publications and 19.5% are conference proceedings papers.

The papers were classified based on the research areas and findings highlighting that business economics ranked highest

publications with 52 papers representing 38.8% from overall papers published on digital transformation (see Fig. 1). Most of those papers are discussing digital transformation impact on the digital business enterprise architecture in order to develop new business models that can integrate digitally into the DNA of the organization existing business models [13]. On top of that, the distribution of the papers according to the publication indicates the limited research concerning digital transformation until 2019 which marked considerable interest in the topic accounting with 110 records (between 2019 to 2021) which represents 82.1% of overall publications in digital transformation (see Fig. 2). Furthermore, 59 publications in digital transformation are from three countries namely Germany, England, and Italy which denotes that 44.1% of overall publications in the field are from European countries only (see Fig. 3). The reason behind these numbers might be due to the adoption of new technologies and enhanced levels of digital maturity across different industry sectors in those countries [13].

TABLE I
LITERATURE SEARCH INCLUSION CRITERIA

Search criteria	Inclusive criteria
Research Database	Web of Science – Clarivate Analytics
Language	English
Search Topics	"Digital Transformation", "Digitalization", "Digitalisation"
Publication Type	articles, review papers, book chapters, conference
Indexes	SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI.
Publication Year	All available publications
Countries/Regions	All available publications
Research Areas	All available publications

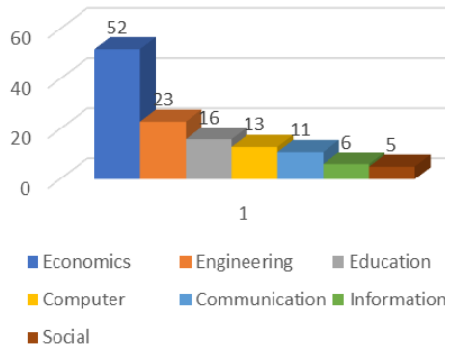

Fig. 1 Publication distribution by research areas

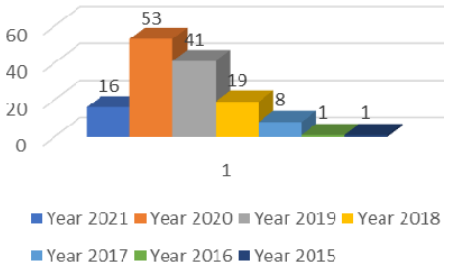

Fig. 2 Publication distribution by research year

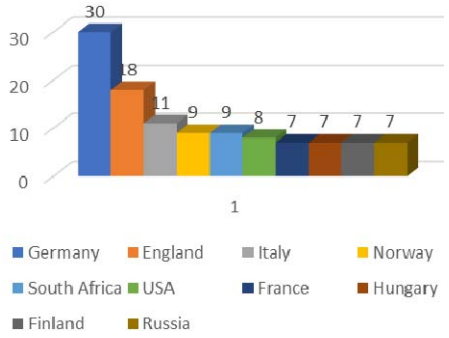

Fig. 3 Publication distribution by regions/countries

Most papers examined are using qualitative methodologies and are theoretical in nature representing 91% of the growing body of research about digital transformation while 9% are empirical papers using quantitative methodologies. These results are in perfect agreement with the literature claims about shortage in digital transformation research. The results of the literature systematic search confirm that until now digital transformation is considered a relatively new research field and limited research is available. Therefore, further investigation across different industries and from different research perspectives is still required [24], [13], [19], [11].

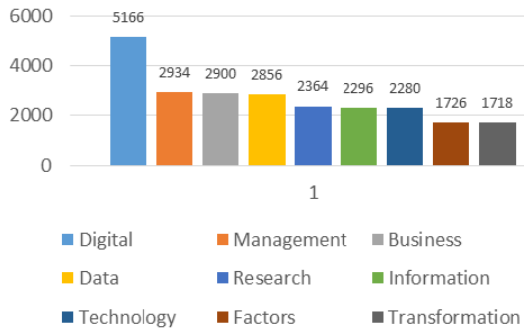

Fig. 4 The most frequent words repeated in the literature

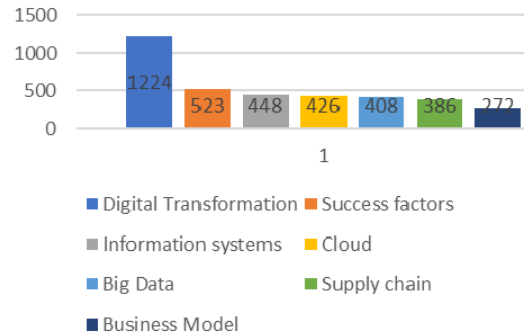

Fig. 5 The most frequent phrases repeated in the literature

A content analysis using WordStat 8.0 was conducted to quantify and analyze the data within the papers examined. Thus, the results of the content analysis will enable the researchers to explore the occurrence of repeated concepts, words and themes across various publications to examine its relationships in order to reach the most agreed key success

factors in previous studies. Hence, researchers can make comprehensive evaluation and inferences about different success factors and interpret its importance and impact on digital transformation. It was found that digital, management, business, and data words are top frequent words (see Fig. 4) depicted in the publications, which indicate the strong relation between the three words in literature and confirm the fact that in order to manage the business efficiently the organization must act digitally [13]. Furthermore, by analyzing the selected paper phrases it was found that the top frequent phrase is digital transformation occurring 1.224 time, followed by success factors occurring 542 time which indicate limited literature in this topic (see Fig. 5). Thus, it is argued that exploring the integration of digital transformation with critical success factors is necessary to identify the common factors identified in previous literature.

The analysis of digital transformation success factors frequencies in the papers included in the study pinpoints that innovation management and agile organization are top most frequent words identified (see Fig. 6). Thus, it can be inferred that innovation and agility are cultural values that will affect the success of digital transformation journey. It is evident that there is no consensus across literature on specific key success factors for digital transformation. In contrary, it is depicted that similar factors are used with different terminologies across studies although it has same conceptual definition. It was also noted that some of the factors identified can be grouped in on construct as they can be used as operational definitions for these factors. Therefore, a dictionary in WordStat 8.0 was created with the words related to success factors for digital transformation. This classification and categorization reproduced a list of most common success factors identified in the literature and that are deemed to affect digital transformation (see Table II) including but not exhaustive to top management support [37]; readiness for new technology [38]; digital business strategy [10]; dynamic capabilities [10]; digital culture [26]; business model [25]; communication; collaborative ecosystem [26]; employees support [39]; technology acceptance; value creation; digital leadership; agile & scalable digital business; innovation [28]. people management; flatter hierarchies; cross-functional teams; customer-centric culture; utilizing data and key performance indicators [40].

In the context of this study, the researchers find it beneficial to build upon the thematic analysis extracted from the literature and use the qualitative Delphi technique that suits the deductive reasoning for exploratory studies. By surveying a panel of experts in the field, the researchers will develop an insightful understanding and valuable inputs from experts' opinions. Thus, the output of the Delphi panel ends up with a consensus level of agreement on the identification and prioritization of the most significant factors for digital transformation that can be further investigated in the future.

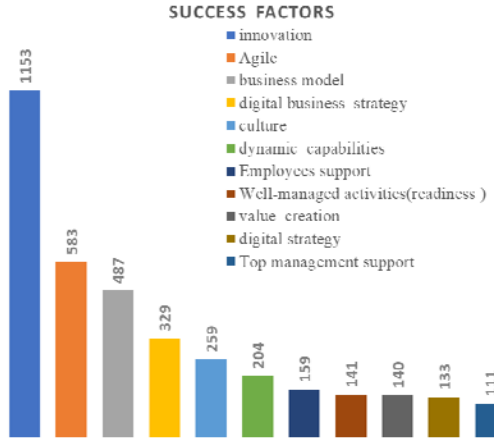

Fig. 6 Digital transformation success factors frequencies in literature

TABLE II
CATEGORIES OF FACTORS IDENTIFIED IN LITERATURE

1. organization culture (innovation and agility)
2. digital business strategy (digital business/digital technology)
3. dynamic capabilities
4. well-managed transformation activities (innovation and process management)
5. value creation
6. digital strategy
7. top management support
8. business process
9. budget
10. business environment
11. collaborative ecosystem
12. lack of communication within the organization
13. change management
14. digital leadership
15. employees' support
16. technology acceptance
17. digital capabilities
18. strategic management
19. business model
20. decision making

B. Delphi Study

The Delphi method uses expert knowledge to achieve consensus on a particular issue through a systematic process of iterative questionnaires with controlled feedback [41], [42]. The Delphi method is useful for gaining insights from experts' collective experience, particularly for exploratory purposes when there is not enough empirical literature [41], [43]. The Delphi technique has previously been applied in the field of digital transformation [44]. It is evident that digital transformation research is still limited and requires further researches to support organizations in their digital transformation journey [45]. It is argued that conducting a Delphi study will help achieve the paper's objective to explore the critical key success factors for a successful digital transformation. Moreover, main benefits of the Delphi technique consist of less data collection time, lower logistical efforts and better usability compared to paper-based research [43].

Multiple authors have stressed [41], [9], [40] the importance

of the selection process for the experts' participating in Delphi study. Ideally, participants should be familiar with the research topic to be able to represent opinions about the field of inquiry [46], [47]. Potential participants from academia should have as main criterion for participation, a research profile that includes publications focusing change management, technological innovations, or investigating aspects of digital transformation and its impacts. Also, practitioners from the industry with strong interest in digitalization or involved in digital transformation projects were targeted for participation in our study. A list of 70 experts including researchers and practitioners was prepared with their name, email address, affiliations, and a sample of their work in digital transformation in the last 10 years. The experts were invited via email explaining the study requirements and requesting their consent to participate.

A total number of 12 experts have accepted to participate in the study whereas 6 are from academia and 6 from industry which is considered acceptable as it fits the experts' panel selection requirements which can relatively range from 10 to 18 members [48]. The structure of the panel combining experts from academia and practice permits obtaining different perspectives from both parties and reaching a reasonable degree of consensus about digital transformation factors. The Delphi method procedure outlined by Schmidt [49] was selected for the purpose of this study to solicit experts' opinions about the success factor themes extracted from the literature and ask them to narrow down the list sent to them into the most important ones, then rank the factors according to their significance in digital transformation success [50]. In line with previous Delphi exploratory research [51], [50], we adopted the Delphi method design by [42] and structured our study into validation, selection and ranking phases.

The first round of Delphi consists of sending a questionnaire via mail to all participating experts listing the success factors obtained from the thematic analysis conducted in the systematic literature review. A brief explanation is included to provide a conceptual definition of each factor. Experts are asked to validate and verify the factors' list, since the researchers are the ones who will create a refined consolidated list based on responses received from experts. At this phase, experts are asked to suggest additional items that might not have been considered in the list, to place the factors into categories they might find more appropriate and to provide their comments and recommendations if they have any. The experts were asked to validate the classification and description and if necessary, provide suggestions for improvement or further clarification. This step was essential for validating our categorization, reducing noise, ensuring construct validity and for giving participants the opportunity to clarify their responses if necessary [50], [43].

The Delphi second round involves sending the consolidated list of factors in a random order to each expert with a request to narrow down the factors into the important ones, and select only 10 factors that they believe are important for digital transformation. After analyzing the experts' responses, we identify the factors selected by more than 50% of the participants to refine the final list (see Table III).

Finally, the third round of Delphi aims to rank the factors and prioritize the most critical success factors in digital transformation. The experts are asked to justify their ranking with comments to better understand the reason behind their decision.

TABLE III
SELECTION OF IMPORTANT FACTORS IN DIGITAL TRANSFORMATION

1. Develop a digital business strategy
2. A supportive organizational culture
3. Well-managed transformation activities
4. Management support
5. Organizational change capabilities
6. Digital leadership
7. Insufficient budgeting
8. Employee support
9. Lack of communication within the organization
10. Value creation

It was found that the experts reached a higher degree of consensus. Referring to Schmidt [49], the degree of agreement among the experts is calculated using Kendall's coefficient of concordance W, as is typical in Delphi studies [51], [50], [43]. A W value of 0.75 is achieved indicating a satisfactory level of agreement, thus the factors in this prioritized list (see Table IV) are considered the most significant and critical factors in digital transformation journey.

Based on our findings from both systematic literature review and Delphi methods, the researchers are able to discuss the theoretical and practical implications of these observations. Furthermore, findings from both systematic literature review and Delphi methods offer recommendations for future research and lay the foundation for building digital transformation theoretical frameworks to enrich literature.

TABLE IV
RANKING CRITICAL SUCCESS FACTORS IN DIGITAL TRANSFORMATION

Critical Success Factors	Factors Selection	Factors' Ranking
Well-managed transformation activities innovation management; business model, process management; change management;	91%	1
Develop a digital business strategy increase efficiencies through technology; customers-suppliers online channels; privacy and security; digital solutions	91%	2
Supportive organizational culture innovation; agility; openness to change; technology readiness; learning organization	91%	3
Top Management support decision making; strategies formulation; allocation of resources; leadership; communication	81%	4
Organizational change capabilities digital and dynamic capabilities; knowledge management; talent management; collaborative ecosystems	81%	5

IV. CONCLUDING REMARKS

We can conclude that well-managed transformation activities, digital business strategy, supportive culture, management support, and organizational change capabilities are identified as the key success factor for digital

transformation. The Delphi finding aligns with previous study [8] that confirms that well managed transformation activities are crucial for digital transformation and that the path for digital transformation is created through different variants and combinations of these activities [10]. Furthermore, all Delphi participants have agreed that digital business strategy is a key success factor for digital transformation, which affirms previous studies [29] indicating that digital business strategy can support an organization in transforming and achieving the intended objectives of digital transformation [10]. On the other hand, the supportive organization culture including cultural values such as flexibility, innovation and agility were identified in the Delphi study as one of the most important success factors for digital transformation which links to the competing values framework (CVF) and highlight the fact that organizations with clan culture, can undergo digital transformation successfully. Such type of organizations creates learning environment, open for risk taking and flexible, which are considered essential cultural values during digital transformation journey [46], [7], [44]. Similarly, top management support was identified as one of the critical success factors as it plays a vital role in formulating digital business strategies, allocating resources and implementing digital strategy projects. This finding is aligned with previous studies that highlight the importance of the top management support before, during and after the digital transformation initiatives and confirms its importance for digital transformation success [37], [27], [52]. Moreover, the experts pinpointed the importance of organizational change capabilities and identified it as one of the critical factors for successful digital transformation. Reflecting on the resource-based view (RBV) and knowledge-based view (KBV) theories, it can be concluded that building tangible and intangible capabilities will support organizations to develop core competencies to differentiates itself and gain a sustainable competitive advantage [10], [53]. Previous studies [52], [53] have indicated that firms having soft criteria or intangible factors like digital business strategy, culture and support from its management and employees as explained by RBV is essential to achieve the required goal from digital transformation [53].

Additionally, comments from experts in the Delphi study pointed out that the factors can be grouped into two general groups "organizational factors and technological factors" which align with some previous study [8] that indicated that categorizing digital transformation into technical and organization factor will simplify the digital transformation journey and will support the organization to allocate the suitable resources for each type of the two categories [26]. Furthermore, other experts recommended grouping motivation from the workforce, communication within the organization, change capabilities, insufficient budgeting, use of technology, digital leadership under the factor entitled "top management support". Finally, experts suggested to further investigate the final consolidated list of critical key success factors identified and its applicability across different industries. Accordingly, customizing different measurement scales versions for specific industry sectors since not all industries are in the same initial maturity digital transformation phase. Also, they raised their concerns that certain companies in specific industries can have processes that are easily digitalized, while other companies cannot easily shift towards digital transformation due to constraints coming from its industry type or general environment conditions such as political/legal conditions. Thus, future research can take an explanatory approach to investigate the driving and restraining forces that can affect these factors. Furthermore, it would be interesting to make a digital transformation readiness tool using the success factors identified in this study to assess each factor and determine the required changes needed to enable digital transformation success. It can be also used as guideline for organizations from different industries to benchmark and evaluate its digital transformation initiatives progress.

Researchers are encouraged to further study digital transformation from different theoretical and interdisciplinary perceptive in light of the fact that previous research on digital transformation is still limited and needs to be further expanded into all business sectors.

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