A Literature Review of Hindering Factors in Digital Transformation Processes

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Abstract. In a world where knowledge management is increasingly dependent on digital transformation processes, it is essential to recognize the barriers and challenges that arise within this symbiotic relationship. Understanding these complexities is crucial for developing effective strategies and identifying key success factors. Building upon this mutual dependency, it is plausible that hindering factors interfering with digital transformation processes may similarly impede knowledge management practices. Hence, it is crucial to consider hindering factors of digital transformation processes when implementing knowledge management in organizations. This paper investigates the aforementioned factual connection through a concept-centric literature review of 50 peer-reviewed papers, conflating the latest research findings to derive a comprehensive model that represents the majority of hindering factors associated with digital transformation processes. Drawn from 132 individual concept definitions, this paper encompasses a total of 34 hindering factors related to seven areas, namely procedures, leadership, resources, structure, culture, environment, and complexity, that potentially impact knowledge management implementations in organizations.

Keywords: Hindering factors · Barriers · Challenges · Strategies · Success factors · Digital transformation · Industry 4.0 · Digitalization · ERP systems

1 Introduction

The interdependence between knowledge management and digital transformation processes is rapidly increasing in magnitude and pace. Studies have shown that the latter can significantly facilitate and solidify knowledge management within and among organizations [43, 56, 13]. According to Zaman et al. [57], special emphasis is placed on one of knowledge management's primary objectives, namely knowledge creation, which digital transformation processes enable by opening up far-reaching opportunities. Simultaneously, empirical findings suggest that knowledge accumulation can foster digital transformation, particularly in the manufacturing sector [42]. This highlights the need for organizations to

approach this symbiotic dynamic with strategic awareness. However, hindering factors obstructing digital transformation processes could potentially spread and jeopardize the broader organizational implementation of knowledge management. A deep and comprehensive understanding of these impediments is essential to mitigate such risks. By identifying these hindering factors, decision-makers can effectively pave the way for successfully integrating knowledge management into the organizational context. Against this backdrop, this study seeks to investigate the following research question:

Research question. What hindering factors occur in digital transformation processes?

2 Theoretical background

To address the research question outlined earlier, it is essential to begin by defining all concepts of relevance. This is crucial for identifying pertinent literature that provides the necessary information to support the study. Consequently, this study explicitly defines the concepts of digital transformation processes and the associated hindering factors to establish a solid foundation for analysis.

2.1 Digital transformation processes

First, the following definition is being used for digital transformation processes:

Definition 1. *"[A digital transformation process is a] fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders." [23]*

This definition was derived through a multilevel theoretical approach, encompassing 134 definitions from extant literature [23]. It involved a comprehensive analysis employing conceptual, semantic, and pragmatic measures, the formulation of a unified definition, and an evaluation by 60 experts from both academia and industry [23]. This rigorous process ensures that the definition provides a robust foundation for use in this study.

2.2 Hindering factors

Second, the following definition is adopted for hindering factors. Notably, existing literature on this topic is deliberately refrained from, as the definition is derived from a distinct conceptual elaboration tailored specifically for this study.

Definition 2. *Hindering factors are understood as those that impede an activity's intended outcome so that this activity can realize its maximum objectively achievable potential in the collective absence of those factors.*

Thus, hindering factors encompass not only the presence of negative influences that may impede progress but also the absence of positive effects, which are equally vital for fostering development and achieving a balanced approach.

3 Research design

For this study, a thorough literature review was conducted by analyzing the following 50 peer-reviewed scientific papers [1–12, 14–22, 24–41, 44–53, 55]. These papers were selected based on the aforementioned definitions and reviewed in relation to their adequacy for representing the topic in question in a twofold manner. First, the definition of digital transformation processes conduced as a guiding principle for the derivation of equivalent concepts, namely digital transformation, Industry 4.0, digitalization, and ERP systems, which were used as key search criteria to identify relevant publications in databases. Other parameters (e. g. organizational constraints) for narrowing the scope of literature selection played a negligible role, as the primary objective was to adhere closely to the definition of digital transformation processes. Second, to contextualize these concepts within the framework of hindering factors, the literature funnel focused exclusively on studies that discussed the presence of barriers and challenges or the absence of strategies and success factors, ensuring alignment with the definition of hindering factors. To this end, articles were carefully examined and analyzed to determine whether they decidedly addressed the reasons behind the failure of digital transformation processes in organizations. Once the selection was determined, these papers were, as Webster and Watson [54] postulate, integrated through a concept-centric review that ultimately encompasses 132 hindering factors, each with its own unique naming, corresponding definition, and categorization at three levels of abstraction. For documentary reasons, all hindering factors were largely extracted verbatim within the framework of 1,425 individual excerpts from the 50 previously outlined papers. Eventually, an iterative approach of refining and revising was carried out until conceptual saturation was achieved. With respect to this, the 132 respective hindering factors were hierarchically structured into two primary, seven secondary, and 34 tertiary categories.

4 Results

Building upon the research design outlined earlier, the following 34 hindering factors of digital transformation processes along three levels of abstraction are identified, each accompanied by a detailed definition.

4.1 Situational factors

Situational factors are understood as context-dependent influences that generally have the tendency to be revised over time and without significant effort.

Procedures

Data This refers to inadequate implementation of essential data management, including faulty data, poor presentation, unclear responsibilities, limited access, insufficient integration, and the lack of transformation of data into information.

Analysis That indicates poorly planned analysis phases, lack of monitoring, suboptimal competitive analysis, insufficient vendor assessments, unclear system requirements, inadequate and careless system testing, and weak risk evaluation.

Strategy It relates to the absence of a clearly defined technological strategy aligned with the business strategy, lack of operationalization into action plans, poor distribution of the strategy, and suboptimal use of key strategic techniques.

Integration Such denotes insufficient integration at operational levels, parallel implementations of new systems, continuous integration, knowledge transfer, and involvement in keeping systems updated.

Standards This concerns the absence of standardized processes to ensure reliability and an organization-wide consensus to reduce organizational differences.

Teamwork That indicates the inability to communicate information, coordinate collaboration within the organization, empower stakeholders to contribute, and methodically strengthen interdisciplinary, cross-departmental, and cross-project cooperation.

Training It encompasses the lack of a basic training program, adequate training for targeted qualification, and organizational commitment that stands up for its raison d'être.

Projects Such refers back to the inability to apply fundamental project management principles, maintain focus, work towards a common goal, provide adequate resources and skills, lead competently as a project sponsor, define tasks clearly, manage teams effectively, avoid high turnover, ensure proper internal and external communication, and establish an interdisciplinary project team composition.

Leadership

Competence This signifies the lack of necessary expertise for implementing digital systems and the required skills for effective and targeted leadership in general.

Inclusion That underscores the absence of comprehensive support from top management, insufficient leadership activities at the operational level and distributive leadership approaches, and a lack of measures for employee involvement.

Conviction It implies a lack of commitment, dedication, and determination on the part of top management, inadequate management of emerging interpersonal issues and employee concerns, and a lack of transformational leadership.

4.2 Constitutive factors

In contrast to situational factors, constitutive factors are understood as fundamental elements whose effects tend not to be revised over time and only with significant effort.

Resources

Cost This refers to an unwillingness to invest and the view that implementation, operation, training, and recruitment of qualified professionals are too costly.

Time That indicates organizational ambidexterity, as operational workloads hinder proper implementation, integration, and requirements analysis monitoring.

Finance It relates to concerns about lengthy amortization periods, uncertainty regarding future returns, especially in terms of ROI, challenges in quantifying economic benefits, and difficulties in making initial investments.

Maturity Such denotes a lack of awareness about successful organizational implementation, high variability in expertise among stakeholders, and insufficient understanding of the peculiar business model and structural setup.

Structure

Infrastructure This concerns inadequate technical infrastructure, both in terms of software and hardware, as well as the lack of sufficient data throughput for the seamless and efficient operation of the system to be implemented.

Conditions That points to the absence of incentive-based conditions, particularly job satisfaction-related ones, required to foster effective organizational behaviors and support a focused emphasis on research and development.

Composition It encompasses the lack of necessary conditions for a multi-perspective mindset among stakeholders, particularly empathy abilities across divisions, and a corporate culture that fosters a holistic viewpoint.

Agility Such refers back to the inability of the organizational structure to be agile and responsive, as well as its failure to promote comprehensive measures for adapting outdated business processes and overall approaches to new standards.

Personnel This signifies the absence of technical professionals for the proper implementation, operation, and maintenance of the system and a lack of comprehensive knowledge regarding the technological implementation.

Culture

Awareness This underscores the initial belief that the implementation is straightforward, the conviction that no significant benefits are to be expected, the assumption that the current business model meets the latest standards, and a culture shaped by unrealistic and utopian expectations of the change process.

Concerns That implies emerging concerns about potential job loss, traceability, transparency, data privacy from an employee perspective, and data security from an organizational standpoint.

Pressure It refers to a culture that exerts insufficient pressure for extensive organizational changes and is characterized by a lack of collective discipline.

Trust Such indicates a lack of trust between stakeholders to foster information flows, a lack of confidence in technological solutions, and the absence of a corporate culture characterized by a fundamentally positive work atmosphere.

Satisfaction This relates to inadequate user satisfaction and poor performance of the system, making its operation inefficient and negatively affecting acceptance.

Attitude That denotes an inadequate corporate culture marked by concerns about the impact of change on operations, a lack of information sharing due to individual rivalries, a strong emphasis on identity and traditional values, resistance to questioning tasks, and a tendency to avoid reliance on third parties.

Interest It concerns the absence of a collective commitment to change and a corporate culture that is open to innovative, progressive, and lasting changes.

Environment

Government This points to inadequate governmental support for expanding national infrastructure and network coverage, a lack of incentives for businesses, minimal establishment of favorable frameworks, generally insufficient support from institutions, and insufficient pressure exerted by the government.

Legislation That encompasses complex legal requirements, uncertain outcomes of regulatory frameworks, and underdeveloped laws that tolerate gray areas.

Market It refers back to the inability to accurately predict technological developments, the challenge of keeping pace with the speed of technological advances, difficulties in navigating a turbulent market environment, the absence of competitive pressure from the industry, the lack of industry-specific implementation roadmaps and guidelines, the absence of willingness for collective change from external partners, and the shortage of qualified professionals in the labor market.

Technology Such signifies the inability of vendors to meet industry-specific requirements, the lack of dialogue between industry and vendors, inconsistency and compatibility issues, and the absence of scalable technological solutions.

Partnerships This underscores the absence of sufficient support from consulting firms and vendors, limited collaboration with educational institutions to facilitate innovation, and inadequate cooperation with external stakeholders.

Complexity

Business This implies the complexity arising from overall technological progress, over-customization through programmed individualizations, integration of new systems into the existing environment, organization-wide data fragmentation, and both user-unfriendly and unintuitive system interfaces.

Setup That refers to the complexity caused by the discrepancy between business requirements and technical system functions, as well as the inherent complexity of the business model itself.

5 Conclusion

In conclusion, the findings of this study highlight seven significant hindering factors that should be carefully considered.

Procedures Taking procedures into consideration is pivotal, given their overall influence on the daily operations of organizations. Internal cross-departmental processes must have strategic clarity regarding their objectives and responsibilities, ensuring effective teamwork and stakeholder consensus. This clarity enables decision-makers to identify the need for further employee training. To achieve this, it is evident that project management plays a crucial role, as it provides a framework capable of meeting this critical need for an analytical approach. It stands to reason that these measures can enhance overall data quality, thereby improving the organization's ability to make robust decisions.

Leadership Acknowledging the importance of leadership is essential for paving the way for structural management within the organization, as decision-makers hold significant influence over organizational behavior. This becomes particularly apparent given that the relationship between leaders and followers must be well-developed, guaranteeing distributed inclusion in decisions. However, the leader's belief in the need for change is critical, as it enables them to steer the organization toward the appropriate channels for change in the first place.

Resources The consideration of resources is critical, exceedingly monetary sufficiency, as it significantly influences the organization's capacity to drive and implement change, including acquiring, commissioning, and operating an adequate system. Specifically, both the availability of time and the maturity level among stakeholders are heavily dependent on sufficient financial resources, underscoring the importance of strategically envisioning adequate funding.

Structure Focusing on structure is fundamental to providing a solid organizational foundation and a framework that can be molded appropriately. Considerable attention must be given to the surrounding infrastructure from technical, organizational, and personnel perspectives. This ensures that the organization remains agile and resilient, capable of navigating demanding circumstances driven by the market and other external factors.

Culture Recognizing cultural aspects is key for fostering an extensive awareness of potential issues and ensuring that collective discipline enables a proactive approach to addressing employees' concerns. By doing so, building organizational trust and cultivating a positive atmosphere becomes feasible, which helps prevent resistance to change. This also promotes curiosity for further advancements among all stakeholders, ensuring continued willingness and adaptability.

Environment Taking environmental elements into account is critical for effective risk mitigation, as it helps to understand which inevitable factors must be reckoned with. In this regard, it is evident that insufficient framework conditions established by the government can have negative repercussions. Unfavorable market conditions, such as technological uncertainty, market immaturity, intense competition, and shortages of qualified labor, can further exacerbate this impact. As a result, nurturing strategic alliances and leveraging the sphere of influence becomes essential to support persistent threat management.

Complexity Last but not least, understanding the role of complexity is indispensable in recognizing the need for analytical approaches that enable proficiency in complex environments. It also helps minimize the occurrence of uncontrolled and difficult-to-manage situations, especially those related to over-adaptation and data fragmentation. Reducing complexity in technical, organizational, and business viewpoints is crucial, as it empowers organizations to actively and purposefully shape and align change.

6 Limitations and outlook

Although the quality criteria relating to accurate scientific research have been included, there are nevertheless limitations that must be taken into account. First and foremost, it must be recognized that some relevant aspects may have been overlooked during the literature review due to confirmation bias. Moreover, only 50 references from a limited range of databases have been included, without ensuring a balanced and systematic representation. This lack of diversity and impartiality in the selection process may have extended bias. Additionally, while the articles selected for identifying hindering factors in digital transformation processes were peer-reviewed, there remains a possibility that studies of lower quality have been integrated. Furthermore, no classifications of organizational sizes and domains have been made, potentially resulting in broad, contextually unsupported generalizations that may not be relevant to specific knowledge management approaches. It is also important to note that certain practices hindering digital transformation processes may still benefit knowledge management, and vice versa. While the plausibility and triviality of such links seem low, there remains a residual uncertainty that these, as yet, implausible assumptions may ultimately prove valid. Nevertheless, this literature review provides valuable insights and lays the groundwork for future research. Although a more systematic approach to conducting future literature reviews in this regard is needed, it is

recommended that the relationship between knowledge management and digital transformation processes be examined in more detail in order to draw more precise conclusions about their common hindering factors, particularly regarding potential conflicts of objectives. Such an approach would ensure that the connections made in this paper are logically sound, contributing positively to the advancement of knowledge management in organizations.

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