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THE PARADOX THEORY IN THE DIGITAL TRANSFORMATION OF SMES

Short Paper

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Abstract

Digital Transformation (DT) holds strategic importance, with extensive research on its implications for Small and Medium-sized Enterprises (SMEs) gaining prominence. SMEs, constituting a dominant force in the European economy, present unique organizational challenges in the DT landscape. Specific elements like resource constraints, leadership centrality, and distinct organizational structures significantly influence the DT process. While DT induces transformative changes across various dimensions, the dynamic environment, coupled with resource scarcity, gives rise to organizational paradoxes in SMEs, a facet often overlooked in existing literature focused on large enterprises. Our research aims to address this gap, exploring the nuanced impact of SME-specific features on inherent paradoxes during DT. Rooted in two preliminary exploratory studies, our findings highlight the importance of analyzing paradoxes within SMEs, emphasizing their association with organizational peculiarities. Effectively managing these paradoxes is crucial for SMEs navigating the complexities of DT and ensuring enduring success.

Keywords: Digital transformation, SME, Paradoxes.

1 Introduction

Digital transformation (DT) assumes strategic significance for organizations, as evidenced by a plethora of studies on the subject (Hess et al., 2016; Vial, 2019). Notably, research has delved into the DT of Small and Medium-sized Enterprises (SMEs, Li et al., 2017; Pelletier & Coultier, 2019). Two justifications underscore this focus. Firstly, SMEs play a central role in the European economy, constituting 99% of businesses and contributing to more than two-thirds of employment, necessitating particular attention to this organizational category. Secondly, SMEs embody a distinct organizational type marked by unique features, emphasizing the need for a targeted examination. Literature identifies factors such as resource constraints (Pelletier & Coultier, 2019), the pivotal role of leadership (Li et al., 2017), the specific operating environment, and the distinctive organizational structure of SMEs (Chan et al., 2019) as SME-specific elements. These factors wield substantial influence over the DT process (Lokuge & Duan, 2021), marking DT in SMEs as a process with specificities differing from larger enterprises on several fronts (Lokuge & Duan, 2021). It engenders significant changes at various organizational levels, encompassing social, organizational, economic, strategic, and technological dimensions (Hanelt et al., 2021).

However, the dynamic change environment, often coupled with the resource scarcity it triggers, introduces conflicting challenges in digital transformation. This dynamic gives rise to organizational

paradoxes within companies, as highlighted by Danneels and Viaene (2022). Effectively addressing and managing these paradoxes is a crucial concern for businesses to proactively navigate the tensions arising from DT. While existing studies on DT paradoxes offer valuable theoretical insights into identification (Danneels & Viaene, 2022), management (Soh et al., 2019), and the types of paradoxes arising from DT (Wimelius et al., 2021), they predominantly center on large enterprises, neglecting the issue of paradoxes within DT in SMEs. We aim to investigate the following question: which types of paradoxes are inherent to the DT of SMEs? Given the distinctive nature of SMEs and the considerable management challenges associated with paradoxes, our objective is to deepen our understanding of the paradoxes that emerge during the DT of SMEs. This paper is grounded in two preliminary exploratory studies of SMEs, substantiating the importance of conducting an analysis of paradoxes in the DT of SMEs. Our findings illuminate the fact that these paradoxes are, in part, associated with the organizational peculiarities inherent in these enterprises.

2 Literature review

2.1 The digital transformation of SMEs

In recent years, Digital Transformation has played a pivotal role within organizations (Bharadwaj et al., 2013). This trend is primarily a response to substantial shifts in the business landscape, marked by profound changes in consumer behaviors, the emergence of new market players with entirely novel business models, and the rapid proliferation of information and communication technologies (Verhoef et al., 2021). Every industry is experiencing the impact, presenting new challenges for businesses across different contexts and sectors. This, in turn, has led to an increasing academic interest in the subject (Hanelt et al., 2021). However, while DT is positioned as a crucial strategic imperative for leaders striving to enhance competitiveness, it continues to pose a practical challenge for them to fully comprehend (Hess et al., 2016). Currently, multiple definitions of DT exist (Vial, 2019). According to Vial (2019: 121), it is characterized as "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies." Despite the variety in other definitions, a common thread emerges in the understanding that DT goes beyond the purely technological aspect and has repercussions on the organizational, human, and strategic dimensions of organizations.

Broadly speaking, research on the topic of DT reveals that processes differ based on the types of organizations under consideration. Specific literature is dedicated to the DT of SMEs, underscoring key organizational specificities that influence DT: the centrality of leadership roles, a more adaptable and flexible organizational structure, and resource scarcity (Wuest & Thoben, 2011; Lokuge & Duan, 2021). Firstly, the organizational structure of SMEs is frequently characterized in the literature as more adaptable, agile, and less formal. For instance, Chan et al. (2019: 439) support this perspective by noting that "compared with large organizations, SMEs are typically less formal, lean, and flatter in terms of their organizational structure." This characteristic of SMEs is closely tied to the central role of leadership, where the owner or manager takes the lead and drives the DT process within the company (Li et al., 2017).

In addition to these organizational specificities, many studies also consider the lack of resources as a fundamental factor when studying DT of SMEs (Pelletier & Coultier, 2019). It can manifest in various forms. Dutta & Ervard (1999) emphasize a lack of financial means as one of the primary obstacles to the DT of SMEs. Additionally, human resources, encompassing employment, skills, and the workforce necessary for implementing DT, are crucial considerations (Dutta & Ervard, 1999). Furthermore, some authors, like Neirotti & Raguseo (2017: 140), believe that technological resources can also be a limiting factor for the DT of SMEs: "in some industry contexts, SMEs are thus losing ground because of poor and limited use of IT resources." These factors have repercussions on the information systems of SMEs, which frequently delegate a substantial portion of their IT functions due to the absence of a dedicated IT department or a Chief Information Officer (CIO) to devise in-house solutions (Wuest et Thoben, 2011). In summary, the DT of SMEs is a specific phenomenon that warrants distinct consideration compared to that in large enterprises. Table 1, derived from a study of Wuest and Thoben (2011),

synthetizes the organizational differences between SMEs and large companies by presenting them in terms of advantages and disadvantages.

Advantage	Disadvantage
High flexibility	Less financial resources
Less bureaucratic (informal)	Less human resources (e.g. for supporting activities)
Strong ties to customer and suppliers	Often conservative and patriarchic structures
Often low fluctuation	Strategy often dictated by strong patriarch
Strong focus on customer needs	Dependent on few knowledge carriers
Often inimitable knowledge and experience in special area (hard to replace)	Often no strong skills to external partners for knowledge transfer (e.g. universities, research institutes)
	No systematic human resources development

Table 1: Organizational specificities of SMEs (Wuest & Thoben, 2011).

Furthermore, SMEs also possess distinctive specificities associated with their operating environment. The business landscapes in which SMEs operate are marked by uncertainty (Lokuge & Duan, 2021), dynamism, and a constant state of flux (Neirotti et Raguseo, 2017). Such an environment provides a conducive backdrop for the emergence of paradoxes within organizations (Schad et al., 2016). Indeed, according to Smith and Lewis (2011), environments characterized by diversity, substantial changes, and resource shortages tend to prominently trigger paradoxes. Given the unique aspects of DT in SMEs, it becomes evident that the conditions are ripe for the emergence of paradoxes.

2.2 The paradox theory of digital transformation: a lack of SMEs consideration

Owing to their pervasive influence across all organizational levels, both macroscopic and individual, and the diverse nature of their manifestations, paradoxes have been a focal point of substantial theoretical research in management sciences for several years (Schad et al., 2016). Smith and Lewis (2011, p.382) define paradoxes as "contradictory yet interrelated elements (dualities) that exist simultaneously and persist over time; such elements seem logical when considered in isolation but irrational, inconsistent, and absurd when juxtaposed." Therefore, a pair of elements is deemed paradoxical when they appear logical in isolation but become mutually incompatible when considered together, with neither element existing independently. These dualities symbolize contrasting aspects that come together to form a unified entity. Thus, the two defining features of a paradox are contradiction and interdependence (Schad et al., 2016). The paradox refers to a situation where the contradiction cannot be resolved by choosing one option over another. Then, these contradictions are a source of tensions. The contradictory nature of paradoxes and tensions that stem from it pose intricate managerial dilemmas for leaders, necessitating the development of a theoretical framework and models to enhance comprehension. This has led to a substantial body of authors focusing their research on this topic (Schad et al., 2016).

Smith and Lewis (2011) categorize various types of paradoxes into four distinct groups: learning paradoxes, belonging paradoxes, performance paradoxes, and organizational paradoxes. Learning paradoxes typically revolve around the challenge of adoption during organizational renewal or innovation processes, stemming from the clash between established knowledge at both individual and collective levels and the introduction of novelty within an organization. This results from the tension between the comfort of the familiar past and the uncertainty of the future, presenting something new (Lewis, 2000). In contrast, belonging paradoxes emerge from questions related to an individual's role and values within a collective context. For instance, achieving a uniform corporate culture while respecting the individual distinctiveness of employees poses a challenging paradox for leaders. Performance paradoxes, on their part, are a consequence of multiple stakeholders with diverse and sometimes conflicting interests, objectives, and strategies. Finally, organizing paradoxes refer to contradictions arising from the implementation of processes, practices, or structures that compete within

the same entity, all aimed at achieving a desired objective. For instance, certain organizations seek to establish a balance between team empowerment and control, giving rise to such paradoxes. Lüscher and Lewis (2008) illuminate this paradoxical scenario from the managers' standpoint, questioning the feasibility of being accountable while delegating decision-making to others. A substantial body of literature underscores the significance of effectively managing paradoxes within organizations, but this study focuses on types of paradoxes linked to the DT of SMEs. Indeed, organizations undergoing transformation confront new contradictory and conflictual elements, thereby giving rise to paradoxical tensions (Gierlich-Joas & Zimmer, 2023).

Some authors have indeed adopted the theory of paradoxes to investigate the process of DT, noting that paradoxes can hinder or even limit it (Soh et al., 2019). Conversely, scrutinizing DT through the paradoxical perspective facilitates its optimization (Volpentesta et al., 2023). Indeed, an organization undergoing DT is more likely to create a suitable context for the advent of paradoxes (Soh et al., 2019). This standpoint encourages an examination of the DT process using the framework of paradox theory. Accordingly, numerous studies have been conducted, focusing on the types of paradoxes brought about by DT, as explained by Danneels & Viaene (2022).

However, we note that, in practice, only Soh et al. (2019) identify paradoxes in the sense of Lewis and Smith, categorizing them into the four theoretical types. Furthermore, it is worth noting that most of these studies are centred on large enterprises. Given the critical importance of managing paradoxes and the necessity of distinguishing the approach to DT between large enterprises and SMEs, it is conceivable that paradoxes should be recognized and addressed in a unique manner.

3 Methodology

Our research adopts an exploratory approach, employing an analysis of two companies to provide initial insights into the paradoxes arising within SMEs during their DT. These are two companies originating from the same economic fabric, operating within the same territory, both facing challenges related to the digitalization of production lines and supply chains.

The first SME (SME 1) was founded in 1959 and currently sustains a workforce of 75 professionals. Specializing in the production of sensors and automation systems, SME 1 deploys solutions for control and supervision within the energy, industrial, and marine sectors. This multi-site organization has its headquarters situated in France, with production facilities spanning the UK, the USA, Tunisia, China, and India. SME 1, having undergone recent substantial growth, has successfully expanded its operations into international markets, characterizing it as a relatively developed SME. Presently, SME 1 strategically directs its DT to provide comprehensive support to its global production units and supply chain, leveraging advanced technologies such as an ERP system. The first objective is to digitize and standardize the production process extensively, facilitating the traceability of sensor manufacturing. To coordinate and supervise the entire DT process, the company hired an IT director shortly before this study. Within this context, we conducted three interviews, each lasting between 1 to 1.5 hours, engaging with the IT Director, the Director of Human Resources, and the Director of the Supply Chain.

SME 2, established 16 years ago with a team of 20 employees, specializes in facilitating the DT of SMEs. Positioned as a manufacturer of innovative turnkey solutions, the company leverages advanced expertise on the Internet of Things (IoT). SME 2's solutions, tailored for sectors such as art, luxury, and industry, enable the localization, monitoring, and securing of critical assets throughout their lifecycle. Internally, SME 2 is progressively undergoing DT, gaining momentum notably propelled by the 2020 health crisis. Given the significant reliance on traditional trade shows for business, the temporary absence of these events served as a catalyst for substantial advancements in digitalization, particularly in marketing and sales domains. Additionally, internal data structuring projects have been initiated, recognizing the pivotal role data acquisition, management, and utilization play in enhancing business efficiency and sustainability. To exemplify this commitment, the CEO orchestrated the organization's structure and processes around an Enterprise Resource Planning (ERP) system. In conjunction with these initiatives, three interviews were conducted, each lasting between 1 to 1.5 hours, engaging with

the Communications and Marketing Manager, the CEO, and the CTO (Chief Technological Officer), responsible for R&D and technical direction.

We consider that SME 1 and 2 are achieving a digital transformation as defined by Wessel et al. (2019) because both companies have integrated their new digital tools into a more global strategic approach, including changes to their organisational processes and practices, which will ultimately result in changes to their value proposition.

Conducted in an exploratory manner, the interviews addressed overarching themes related to the DT of both companies. Participants were queried on challenges and issues associated with DT, allowing for the natural exploration of various paradoxes and tensions encountered in their daily experiences. This exploratory approach seeks to provide a snapshot of the paradoxes related to the DT of SMEs. We follow Wimelius et al. (2020) methodology to identify paradoxes. Leveraging the Nvivo software for analysis, the inductive coding process unfolded in two phases. Initially, all elements of tension linked to DT were documented. Subsequently, tensions specifically related to paradoxes were selectively retained, facilitating their classification based on the four paradox types identified by Smith and Lewis (2000): the paradoxes of learning, appropriation, organization, and performance.

4 Results

The examination of SME 1 and SME 2 has illuminated various paradoxes linked to their DT. In this section, we delve into each paradox to enhance our comprehension of the underlying mechanisms and their contextual relevance for the respective company.

4.1 Paradoxes of performing

The scarcity of human and temporal resources constrains engagement in DT projects, which are not short-term priorities, despite the perceived necessity by stakeholders at various hierarchical levels. This often leads to the postponement of business transformation until there is no alternative but to proceed. According to the CTO of SME 2, *"The roadmaps are already quite full to meet client demands. So, for now, it's always a matter of priorities. The priority is the client, and the remaining time is either spent on our own development"*. The other stakeholders interviewed share a consistent perspective on the matter. This underscores the paradox between the desire to transform and the imperative to remain profitable in its daily activities. While financial ROI is easy to calculate, the ROI on human resources is complex to evaluate, relying on the intuition of the leader.

4.2 Paradoxes of learning

Paradoxes of learning are evident within SME 1. Notably, during interviews, a prominent paradox emerges concerning the resistance of certain experienced individuals to adopting specific tools, posing challenges in adaptation. The IT director explicates that *"individuals with several years of tenure find it more challenging to adapt to this DT compared to their younger counterparts, who exhibit rapid and flexible adaptability to DT tools"*. Moreover, in SME 1, DT is initiated by the leaders but carried out and embraced by the front-line employees, which can lead to misalignment in the practical use of final digital solutions. As an illustration, the Director of Supply Chain delineates this paradox through the implementation of touchscreen tablets in workshops aimed at enhancing product tracking. However, he poses a practical challenge, stating, *"How do we navigate the pages with soiled fingers, gloves, and various other considerations? Consequently, we encounter highly technical issues. Nevertheless, it is evident that there is a compelling interest in pursuing such initiatives"*. This leads to the last learning paradox identified. The HR director elucidates that the organization is deeply committed to facilitating user support and feedback during periods of change. The Director of Supply Chain emphasizes the fundamental importance of considering the human dimension in DT, which significantly complicates the overall process. Consequently, the company has implemented an e-learning platform to aid in user assistance and training. Certain training modules are obligatory, with rigorous oversight by the HR department. However, a nuanced perspective is observed from the IT director, who contends that the

company is *"not actively seeking feedback from end users to ensure their commitment, comprehension, and effective use of the implemented tools. Merely conducting training does not guarantee user endorsement"*. Consequently, digitalized training initiatives are deployed, with no incorporation of user feedback.

4.3 Paradoxes of organizing

As delineated in the methodology section, the DT initiative within SME 1 is intricately aligned with the digitization of its production processes across its globally dispersed manufacturing facilities. This dual-purpose endeavor seeks to elevate operational efficiency and product quality, concurrently providing heightened oversight and transparency of the company's assets and data for the executive team. Notwithstanding the recent onboarding of an IT director, the organizational constraints manifest in insufficient human and financial resources prevent independent execution of these ambitious digital projects and tools. Consequently, SME 1 finds itself necessitated to subcontract a segment of its digital operations. This strategic choice, however, entails an inadvertent relinquishment of control over the intricate flow and exchange of corporate data, thereby contradicting a pivotal initial objective of the overarching transformation. Elaborating on this aspect, the Director of the Supply Chain elucidates, *"You inevitably encounter a lack of mastery over a gamut of exchanges. Outsourcing compels you to relinquish control over the digital conduits—be it servers or clouds—effectively rendering you captive within a highly specialized and captive IT market"*. We consider this as a paradox of organizing because it is linked to the implementation of practices that compete within the same entity, which are control and externalization of data.

Moreover, the dearth of resources introduces an additional organizational paradox. As expressed by the CTO of SME 2, *"In a larger enterprise, they would dedicate an entire team to manage digitization and initiate the process. In a smaller company with around 20 personnel, it becomes challenging to allocate even a single individual for this purpose"*. This situation forms a self-perpetuating cycle because the SME needs to undergo transformation to foster growth. However, this transformation demands growth itself to be executed optimally.

4.4 Paradoxes of belonging

One of the aims of digital transformation is to simplify and enhance the daily lives of operational workers, but it can also lead to negative social consequences: for instance, relocation allowed by new digital technologies of communication, or the replacement of workforce by a machine. This is considered a paradox of belonging as it echoes a contradiction between the overall objective of digital transformation and the potential implications it has on individuals. To illustrate it, the SME 1's multi-site organizational structure introduces a belonging paradox associated with DT projects. Notably, these paradoxes resonate with past instances of relocation. Teams situated in France, where a final production line persists, exhibit greater resistance to the implementation of digital solutions. The IT director elucidates, providing an illustrative example, *"for instance, the barcode reader is extensively utilized in Tunisia, and the Tunisian teams express satisfaction with its functionality. Conversely, here, (...) a reluctance to embrace this process exists due to (...) historical reasons; Marseille served as the primary production site, and significant workforce reductions occurred in Marseille. The manufacturing unit underwent relocation to Tunisia, and (...) latent apprehensions are indeed present"*. It is noteworthy that this aspect did not emerge during the interview with the HR Director.

A paradox of belonging is also intricately linked to the aspiration of standardizing processes through digital means while concurrently acknowledging diverse cultural considerations. This paradox is explicitly articulated by both the HR director and the IT director, who underscores the imperative to *"consider cultural aspects"*.

5 Discussion and further contributions

This exploratory study has brought to light several paradoxes, some of which are indeed linked to the specificities of SMEs (see table 2).

Nature of paradoxes	Paradoxes identified	SME organizational Specificity
Paradoxes of performing	Need to transform to gain profitability while remaining profitable in its daily activities.	Lack of resources
Paradoxes of learning	The difficulty of adopting new tools is more pronounced for older individuals than for the younger ones. Digital transformation is initiated by the leaders but carried out and embraced by the front-line employees. The approach is top-down for deployment, but there is no bottom-up feedback to ensure user adoption and if training is suitable.	Same for large companies Centrality of leadership Centrality of leadership
Paradoxes of organizing	SMEs to outsource a significant part of their digital transformation implies a lack of data control and dependence on service companies. The goal is to save time resources (time efficiency by optimizing business practices), but digital transformation is limited precisely due to this time shortage.	Lack of resources Lack of resources
Paradoxes of belonging	For a multi-site company: the paradox of standardizing processes while considering cultural aspects. DT's positives global implication VS potential negatives individual implications	Same for large companies Same for large companies

Table 2: Paradoxes in DT of SMEs.

The lack of human, financial, and temporal resources give rise to performance paradoxes, balancing the desire for transformation with the necessity of maintaining profitability in daily activities. Additionally, the limited capacity to dedicate an individual or a group solely to the DT process poses challenges. Even with the recent hiring of an IT Director at SME 1, the implementation of DT represents only a fraction of their activities. In SME 2, no one holds such a role, and projects are initiated based on the availability of human resources, which is often scarce. Furthermore, the centrality of the leader or the leadership team influences the DT of the studied SMEs. In SME 1, transformation projects are initiated by leaders but are driven by the frontline actors. This can lead to operational misalignments and the failure of solutions intended to simplify the lives of operational teams, whose feedback is rarely considered, neither at SME 1 nor at SME 2. Moreover, other paradoxes have been identified, more related to the nature of DT itself, such as differences in adoption between newer teams and those with entrenched habits. This type of paradox is also highlighted in literature discussing larger enterprises. Finally, paradoxes related to the specific contexts of the studied companies have emerged. The geographical dispersion of SME 1 serves as an excellent example, giving rise to paradoxes of belonging.

Our exploratory research now needs to be pursued to enhance its generalizability to theory (Lee & Baskerville, 2003). We want to analyse more SMEs to see if new paradoxes emerged and to understand more deeply, in their specific context, these paradoxes.

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