Breaking Out of the Digitalization Paradox

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Abstract. Despite the acclaimed potential of industry 4.0 for efficiency and growth, statistics show that the majority of firms' digital transformation programs fail to meet their objectives. We provide a plausible explanation of this understudied phenomenon through theoretical discussions on the four overlooked paradoxical characteristics found between digitalization activities. Further, using the lens of lean and dynamic capabilities theory, we propose strategies for firms to transcend the paradoxes and in turn, realize their expectations of the transformation initiatives.

Keywords: Digitalization · Paradox · Dynamic capability · Lean

1 Introduction

Being driven by the fear of missing out, many firms today tend to jump into this new, and trending bandwagon of digitalization without adequate understanding of the meaning, relevance, and implications. This of course leads to unwarranted failures despite the potential of revenue growth [1]. The findings of a survey conducted by Accenture strategy involving Scandinavian business leaders revealed that they need to "rethink their interpretation, approach and outlook on digital to maintain their competitive edge and guard against disruption"[1]. Further, a more recent article finds that 70% of the digital transformation initiatives fail to reach their goals [2]. Literature refers to this phenomenon as "digitalization paradox", as the investments on digitalization does not always produce the obvious or expected positive outcomes and contradicts the premise of revenue growth [3, 4]. While much has been written about Digitalization use cases and potentials, relatively little has been written about the paradox or the underlying causes. Understanding and addressing the paradox is becoming important as more and more organizations are investing on digitalization. Further, little is known about the intersection of digitalization and lean or about "Lean Digital" or "Digital Lean" paths to revenue growth. In this research, we aim to address these gaps. Through theoretical discussions on the intersection of digitalization and lean approaches and using the lens of dynamic capability theory we elaborate on: what causes the phenomenon of digitalization paradox and how firms should address it?

[1] https://www.accenture.com/no-en/insight-digital-nordic-wake-up-call-norwegian-businesses.

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The study contributes to this growing body of knowledge by exposing the inconsistencies in the conventional reasoning or assumptions at the intersection of lean and digitalization. The discussions on the overlooked paradoxical characteristics and the dynamic capabilities approach in context of the digitalization paradox provides new insights to this debate. Further, building on the contemporary lean literature, including the identified patterns of digital transformation in the context of lean production, namely "sustaining pattern" (of firms that are highly committed to lean production) and "disruptive pattern" (of firms that show low commitment to lean production) [5], and using our two-by-two framework, we elaborate on why two distinct strategic approaches are needed depending on the expectations of revenue growth. The first is problem driven with a focus on the existing customers and improving value, while the second is radical, with a focus on creating opportunities of new value and customers.

2 Digitalization and the Paradox

Digitalization to date emerge as a vague concept which at times is used interchangeably with 'digitization' or 'digital' and at times viewed under the label of industry 4.0 [6]. Nonetheless, digitalization is "more than digitizing operational processes" and is broader in meaning than industry 4.0 [7]. It can be viewed as a capability that is developed to exploit digital opportunities for operational efficiency and revenue growth [8–10]. Capabilities represents the capacity of a firm to deploy a combination of resources or a set of skills and proficiencies required to achieve the desired outcome [11, 12]. Firms differ in their "competence" and "capabilities" to engage in new technologies in their specific environments or context [6].

Digitalization can be a challenging activity and may require heavy investments and integration of various decision-making platforms and tools [13]. Nevertheless, its relationship with performance is considered complex, or even non-linear. Despite the potential for revenue generation, firms struggle to attain the expectations [4, 13]. Digitalization paradox refers to this phenomenon in which firms "invest in digitalization but struggle to earn the expected revenue growth" [3]. Studying such paradoxes become important because they expose inconsistencies in our reasoning or assumptions and present problems in fundamentally different ways [14]. In the following subsections, we theoretically elaborate on the four overlooked paradoxical characteristics found between digitalization activities that contribute to the digitalization paradox.

2.1 What is Most Obvious is Most Hidden

In the rush to leverage the opportunities, or being overly enthusiastic about the potential of a new technology, firms ignore systematically assessing the true value, or even implementing the necessary processes for delivering that value. Firms are often so engrossed in the technological marvels, that they lose sight of what is it really for and how it truly makes a difference in a specific business context for customer value addition. The benefit becomes too obvious to even conceive. This is similar to when watching a movie at home: we tend to lose sight of the screen and the surrounding environment as we get engrossed in the movie. This is a natural process, as otherwise,

the consciousness about the background or the medium would be utterly distracting for us to focus. But that does takes us away from the obvious reality of where we are for the moment [15]. The implications of this phenomenon in context of digitalization could be associated with what Linde et al., [4] identified as the common digital traps leading to failures, namely, "pushing out a digital business model without understanding customer value" or value proposition, "promising additional gains without understanding the value delivery process", or "getting sold on the digital opportunity without understanding the profit formula".

2.2 Simplification Complicates

Organizational problems can be "messy" and "ill-structured" and to address them, the top management often tend to focus too much on big data and digitalization initiatives [16, 17]. Nevertheless, purely quantitative analysis could be ineffective [18]. Following the previous discussions on the paradox of obvious, overreliance on such quantitative approaches at the strategic level attenuates managers' attention to the basic questions concerning which problems to address, kind of information needed and how it could be interpreted. Nell et al., [19] refers to such issues also as digital traps, and observes "easy access to seemingly hard, concrete, and particularly insightful data, especially if it seems comparable across divisions or over time, can tempt managers to oversimplify complex problems and discount experience and other sources of knowledge." For effective implementation, firms require to build the analytics culture or capabilities [20] and be conscious of the data driven decision making biases [21, 22]. The paradox of complexity suggests simplification complicates [15]. Moreover, technology transfer often starts with decontextualizing or abstracting the useful aspects and recontextualizing it to the new settings. The recontextualizing process may not be completely successful and can lead to unexpected problems. Context becomes highly important for technology transfer. Blindness towards it could lead to complications of different forms, from social, to environmental, to economic.

2.3 Outcomes of Path Dependence are Compared with Options of the Past

Like a tapering process, path dependence leads to decisions taken at one stage of development in a firm narrowing the scope of actions in the next stage and so on. The firm eventually get trapped in a predetermined path towards a specific trajectory of growth and loses its ability to change [23, 24]. The outcomes of the path dependent sequences contradict the predictions of prevailing theoretical framework for implementation only with respect to options that were available in the past and not those presently available. This leads to what is referred to as the paradox of path dependence. For example, when a firm realizes the inefficiencies of the path or framework of technology adoption, technology reversal being an extremely costly affair, may not be an alternative option at all.

2.4 Focusing Relentlessly on Efficiency Hinders Growth

Firms today often approach digitalization from the capabilities lens and benefit majorly from operational or cost efficiency through elimination of waste or achieving excellence in individual functions [1, 25]. The efficiency path affects relative cost positions and is an important source of profitability and competitive advantage. Further, it is easier to measure returns on the investments for cost efficiency and operational excellence [1]. This path typically adopts a holistic or systems view that requires all the individual elements of the system to be aligned and stresses on internal stability over time to achieve efficiency. This helps in maintaining homogeneity across similar systems. Nonetheless, "relentless pursuit of efficiency in operational tasks can drive out the capacity to change" [26].

3 Breaking Out of the Paradox

3.1 Dynamic Capability Approach to Digitalization

Largely, a holistic systems view is adopted to develop digital (zero order) capabilities that focusses on operational efficiency (or simplification) [1]. The systems approach with its biological orientation of *homeostatic equilibrium* of living organisms and its reactive stance seeking to remain aligned with the "survival requirements of the mega-system in which it is embedded" [26], matches only with the path dependent vision of firms. This approach to digitalization does not recognize the significance of bottom-up innovation. Dynamic capabilities aim for the systemic change to start from within [26] and realizes the relevance of bottom-up innovation, especially for non-evolutionary knowledge creation or breakthrough (or proactive entrepreneurial actions towards new designs). Contrary to systems approach, it does not advocate equifinality, the idea that different systems can follow different combinations of paths and conditions to reach an identical outcome [26]. The notion of "Equifinality" is similar to the ideas of "one best way" or "standardized work" that are traditionally considered central to Lean thinking [27]; this perspective however, limits the idea of lean only to *efficiency* enhancement while ignoring its potential for *growth*. Dynamic capabilities view, by contrast, emphasize on heterogeneity in outcomes to support competitive differentiation [26]. Through this approach, digitalization typically focusses on outmaneuvering competitors through a combination of technologies and strategy. In this current era of Schumpeterian competition, uncertainties, and disruptions, manufacturers must comprehensively take control of their digitalization efforts to embrace new growth opportunities for competitiveness and value creation [1] as well as for maintaining evolutionary fitness (or the ability to respond to opportunities) over time [26, 28].

Given this background and upon synthesizing the various aligned definitions (refer to [8, 13, 29, 30], and Gartner report[2]) we reconceptualize digitalization as: a dynamic

[2] https://www.gartner.com/en/information-technology/glossary/digitalization.

capability (or a meta-process[3]) that evolves over time and may vary upon purposes, developed to exploit digital opportunities for revenue growth by continuously improving on and finding new sources for operational efficiencies or by changing, reinventing or creating new business models to generate new revenue sources and value producing opportunities. Digitalization when approached from dynamic capabilities perspective, combines both the evolutionary and the entrepreneurial strands necessary for revenue growth.

3.2 Combining Lean and Digitalization

The discussions concerning the paradoxical characteristics in the preceding section provides a set of plausible explanations for the digitalization paradox. For example, missing the obvious, or in other words lack of due diligence on the value propositions affects the decisions on how digitalization is to be approached. We posit that following lean principles in digitalization initiatives can significantly address these identified concerns or paradoxes. Combined adoption of Digitalization and Lean is found to have positive impact on performance [31]. In fact, Lorenz et al. [32] found that "lean is needed as a foundation for successful digitalization" and the two concepts are "complementary, not contradictory". Digitalization and Lean ideas could be combined through two approaches: the "*Digital Lean*" or the "*Lean Digital*".

Digital Lean. Digital Lean approach in the recent years have started gaining attention of the academics and practitioners [7, 31–33]. By Digital Lean we refer to digitalization for problem solving and continuous improvement, with a mindset of customer value enhancement, and in turn, revenue growth. Here, the goal is to do more with less, that is, to explore growth opportunities following an evolutionary learning path of reducing wastes and inefficiencies. Contrary to the traditional idea of lean as a path-dependent way of looking only inwards for waste elimination and efficiency, the digital lean growth path, following the dynamic capabilities view of digitalization, promotes an outward approach of continuous improvement through discovery and learning. The organizations today should not only be able to adapt to changing business environment, but also try to shape it. Moreover, for complex systems it is not easy to infer the characteristics of the whole; digitalization or the systemic change should instead start from within considering the interactions of the individual elements with a focus on value (and that becomes the basis of heterogeneity across firms) [26, 34]. To remain competitive, manufacturing firms today must consider breaking out from the path dependent "efficiency trap" to embrace the growth or transformation opportunities offered by digitalization [1].

Lean Digital. The Lean Digital path is distinct from the digital lean path that follows a lean-first approach to digitalization, in which digitalization facilitates lean implementation for continuous improvement. The lean digital path instead follows the

[3] A meta-process is "that orchestrates a number of processes, best practices or competencies to manage comprehensively and systemically, something that is strategically imperative, including the strategy development and execution process itself" [25].

digitalization-first approach but in a lean way, that is, avoiding digitalized wastes. By digitalized wastes [32], we refer to components of a digital initiative that does not directly or indirectly create value for customers or other stakeholders of the business. Here the goal is to do new for more, that is, creating new revenue sources through new value propositions, business models, services, or products, but with a mindset of avoiding digitalized wastes (or in other words, to pursue purposeful digitalization). Lean digital approach follows a non-evolutionary path that supports breakthrough innovation or proactive entrepreneurial actions that embrace new growth opportunities.

Synthesis. We develop a two-by-two framework (see Fig. 1) to categorize firms based on the Lean and Digitalization initiatives and the paths they may follow and show how there exists two growth paths. In this paper, we primarily focus on Quadrant 3 (Q3a and Q3b). Q3a represents the Lean Digital zone, while Q3b represents the Digital Lean zone.

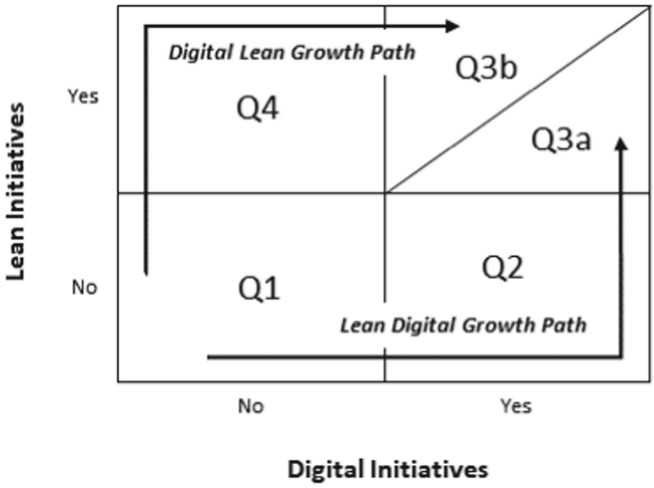

Fig. 1. Two-by-two framework for understanding lean and digital interactions

Given the above discussions on the digital lean and lean digital approaches, we observe several contradictions between them. The recent literature as we have described earlier, have found lean and digitalization to be "complementary, not contradictory". While we largely agree to this conclusion, we argue that the path to complementarity is distinct for the lean digital and the digital lean approaches and summarize them in Table 1.

Table 1. Digital lean versus lean digital

Digital-lean	Lean-digital
• Lean-first approach to digitalization (Digitalization for Lean)	• Digitalization-first approach but in a lean way (Lean for Digitalization)
• A problem solving/improvement initiative	• A breakthrough innovation initiative
• Goal is to explore opportunities to reduce waste (or Economizing) with a focus on revenue growth	• Goal is to explore opportunities for creating new revenue sources by creating new business models, services, or products, using technology and data
• For creating needed value for the existing customers	• For creating new/additional value or for targeting a new customer segment altogether
• Doing more with less	• Doing new for more
• Pursue an evolutionary learning and discovery path	• Pursue non-evolutionary path supporting entrepreneurial actions for breakthrough

4 Conclusions

This research concludes that for revenue growth, or to address the phenomenon of digitalization paradox, a dynamic capabilities approach to digitalization is more suited than top-down holistic approach. Further, we identify and present four paradoxical characteristics that also affects revenue growth through digitalization. A strategic approach to purposeful digitalization or reducing digitalized wastes showed to be vital to address these concerns. Combining lean approaches with digitalization thus, emerged as the key solution. The two strategies of combining lean and digitalization discussed in the paper, namely, digital lean and lean digital, are suited for different outcomes and expectations and hence firms should be conscious about which strategy to choose.

Further research is needed to validate and refine the framework proposed in this study, as well as to uncover any inconsistency or exception. Such research could adopt the case study method comparing and contrasting between (a) practicing lean firms that underwent digitalization of their lean processes or activities, and (b) firms that were not practicing lean, and underwent digitalization. Another plausible extension to this study is to empirically identify the more contextually embedded (and possibly paradoxical) tensions emerging of the specific digital lean initiatives.

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