

Digital Transformation and Sustainable Business Models

Evangelos Katsamakas 

Gabelli School of Business, Fordham University, New York, NY 11101, USA; katsamakas@fordham.edu

Abstract: This article explores several aspects of digital transformation, including definition, enabling technologies, and strategies. It argues that firms seeking to maximize the impact of their digital transformation strategy should aim to build a Sustainable Business Model (SBM). In addition, it introduces the seven articles of the Special Issue. Overall, the article takes a systems approach that appreciates the dynamic complexity of digital transformation and suggests some directions for future research.

Keywords: digital transformation; business model; platform; sustainability; artificial intelligence; complexity; systems approach

1. Introduction

Digital transformation has attracted significant attention in business practice [1–3], and recent review articles outline several research themes [4–12]. There is no unifying definition of digital transformation [13]. For our purpose, digital transformation refers to the use of digital technologies to transform a firm creating business value. A firm may go through a transformation randomly. However, it is reasonable to assume that the transformation is purposeful, which suggests the existence of a digital transformation strategy [14]. A digital transformation strategy entails an objective (vision), a process, and an outcome, which may not converge to the initial objective. Digital transformation consists of at least two dimensions: the enabling digital technologies and the level of transformation.

Digital technologies enable novel applications and value creation in firms. The enabling digital technologies of digital transformation include Artificial Intelligence (AI), big data and analytics, cloud computing, mobile technologies, blockchains (DLT), Augmented and Virtual Reality (AR/VR), Internet of Things (IoT), and other emerging and exponential technologies. Technologies are never stand-alone; they are combined and recombined to create more complex technologies leveraging various interfaces (APIs) and architectures. Practitioners often group technologies in industry groups, such as fintech, adtech, and edtech. However, it is unclear how digital technologies may help companies achieve a desirable digital transformation.

Another dimension of digital transformation is the level of transformation. It may focus on products, business processes, or the business model. Digital is qualitatively different from physical. Digital products exhibit low marginal production and distribution cost, lack of production and distribution capacity constraints, real-time feedback from customer use, and frequent updates. Digitalization has transformed most content industries, including books [15]. Physical products are augmented with digital elements to become smart and connected—a second-order effect is that those hybrid products become sources of new data and platforms for new digital services.

The most powerful digital transformation takes place at the business model level. Network effects can be a powerful force in digital business models because they create a large-gets-larger reinforcing feedback loop, leading to potentially winner-takes-all market outcomes. Network effects are demand-side economies of scale—the value of a product increases as the users increase. Strong network effects help the large network attract new customers, charge high prices, and enjoy protection from competition due to collective



Citation: Katsamakas, E. Digital Transformation and Sustainable Business Models. *Sustainability* **2022**, *14*, 6414. <https://doi.org/10.3390/su14116414>

Received: 17 May 2022

Accepted: 19 May 2022

Published: 24 May 2022

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switching costs. The large network captures significant revenues and profits as scale brings low operating costs (supply side economies of scale). Scale also allows for the accumulation of data used by machine learning algorithms to optimize customer experience, which brings even more customers [16]—this AI feedback loop is sometimes misleadingly called the “data network effect” in the business press. In summary, strong network effects signify a business opportunity. However, managers fail to grasp that a network effect is a two-sided story: it helps a firm grow when it works for that firm, but it may work against the firm, hindering its growth or accelerating its decline.

The term platform has multiple meanings in the English language depending on the context, which may create confusion. However, the meaning of platform as a business model is clear: a platform provides an infrastructure that connects two or more groups (sides) of participants and facilitates their interaction. It is an asset-light model that leverages cross-side network effects. While this concept is not new, the prevalence of the digital platform business model [17,18] is new and noteworthy. However, managers fail to grasp that building a successful platform business model and associated ecosystem is not a trivial task: a platform may fail to grow or fail after it grows.

A firm seeking to maximize its digital transformation’s impact should aim to create a Sustainable Business Model (SBM). An SBM is a business model that withstands the test of time (survives and thrives over time), while it may also strive to achieve other sustainability goals defined in the business model. For instance, an SBM may seek to create value for multiple stakeholders or to accomplish another specific social or environmental objective. Our definition of SBM is a superset of the Business Models for Sustainability (BMfS) concept [19], which focuses on environmental sustainability, and extends prior SBM work [20,21].

The SBM definition underscores that time is a crucial dimension in analyzing an SBM. Performance through time is path-dependent. A proper analysis considers the past performance trajectory and identifies potential future performance pathways. Digital transformation should aim to influence future performance pathways.

Firms intensify their digital transformation investments as a response to perceived environmental complexity. However, digital transformation may include unintended consequences, such as security and privacy challenges, misuse or abuse of data and algorithms, uncertain future of work, loss of control of AI, digital convergence, and digital disruption. Digital convergence refers to distinct markets becoming overlapping as everything becomes digital—this has implications for managers because it blurs the boundaries of competition. Digital disruption refers to incumbents losing their dominant position due to a disrupter firm. Technologies are not disruptive; business models enabled by technologies are.

Paradoxically, all those outcomes are increasing rather than decreasing the environmental complexity. Digitalization is eating the world, reshaping firms, markets, and societies at an accelerating pace. Interconnectedness increases complexity—competition shifts to a new level [22], and platform business models evolve into multi-platform ones [23,24]. Cycles of disintermediation and re-intermediation, decentralization and re-centralization, and unbundling and re-bundling occur. Managers may achieve automation-driven efficiency gains and digital resilience in the short term, but digital instability reigns in the longer term. In their failure to understand and manage complexity, a manager’s only option is to invest in the next wave of digital technologies.

Managing complexity requires an overarching systems approach [25,26]. Complex systems exhibit behavior that is counterintuitive, difficult to comprehend, and policy resistant. Managers need to understand the system structure that drives its behavior over time and identify leverage points.

A systemic digital transformation strategy should seek to leverage valuable resources (such as enabling technologies, data, algorithms, and technology talent) that reinforce each other and align with the firm objectives. It needs to consider how all the system components fit together. It needs to orchestrate the whole system. Explicit consideration of the dynamics over time is crucial. Fragmented and myopic strategies that focus on the latest

overhyped technology (e.g., an IoT strategy), or one-size-fits-all recommendations, fail to take a system view and are likely to underperform. Indeed, many digital transformation projects fail to meet their objectives [27,28], although the ongoing COVID-19 pandemic has accelerated digital transformation [29]. A digital transformation strategy may also involve modernization of existing IT infrastructure, agile product development and operations (DevOps), a rapid digital experimentation culture, and data-informed management. The latter should not be confused with data-driven management, a perilous approach equivalent to driving a car by looking only at the back mirror (good luck with that!).

2. Special Issue Articles

The call for papers for the Special Issue “Digital Strategy, Digital Transformation and Sustainable Business Models” appeared in April 2020. The Special Issue closed in October 2021, and it published seven research articles in total.

Sustainability reporting is an essential dimension of a firm’s CSR initiatives. The disclosed information may be helpful to various stakeholders, including customers, employees, and ESG investors. The contribution by Ning and co-authors [Contribution 1] deploys text mining techniques to identify the strategic intent of sustainability reporting. It also investigates how sustainability reporting affects the firm’s financial performance. The article demonstrates the value of applying advanced analytics techniques in empirical sustainability research using unstructured data.

Blockchains promise decentralization, transparency, automation via smart contracts, and other business benefits. Bekrar and co-authors [Contribution 2] discuss the impact of blockchain on supply chains in the circular economy context. Sustainable supply chains are crucial for sustainability in business. The article focuses on reverse logistics and transportation and relevant blockchain dimensions, use cases, and opportunities for future research.

The COVID-19 pandemic disrupted all aspects of economic and social life globally. Pavlov and co-authors [Contribution 3] analyze the effects of COVID-19 on the financial sustainability of universities. The article identifies six components of the COVID-19 shock. It develops a computational (system dynamics) model used for scenario analysis and stress testing of university finances. The article shows that specific interventions by university administrators may have unintended negative consequences. Overall, the article demonstrates that computational modeling and feedback analysis can provide novel insights to university leaders [30].

Two Special Issue articles focus on algorithmic pricing. Pricing algorithms may bring several efficiency benefits but also create new challenges. Hutchinson and co-authors [Contribution 4] discuss the collusion implications of pricing algorithms and associated firm liability issues in various jurisdictions. Sanchez-Cartas and co-authors [Contribution 5] build a computational (agent-based) model of a market where a high impact event causes price gouging. Firms set prices using evolutionary algorithms. The article investigates the impact of unexpected events on prices and ways to mitigate price gouging. Overall, the increasing adoption of algorithms in business can have significant strategic and economic implications, so additional research is needed [31,32].

The two last contributions focus on platforms. Many platforms rely on revenue from advertisers to ensure their financial sustainability. Liu and co-authors [Contribution 6] analyze how such platforms set prices and offer value-added services for advertisers in a game-theoretic analytic model of competing platforms. Katsamakos and co-authors [Contribution 7] show how digital platforms maximize social impact. The article defines platforms for the common good and explains how such platforms create value through network effects and other feedback loops. It argues that systems thinking could help social entrepreneurs understand and leverage the feedback loops within business models.

Overall, the Special Issue has good methodological diversity. Its articles make research contributions that provide beneficial insights for leaders and policymakers across multiple sectors, from commerce to higher education.

3. Conclusions

Digital transformation can transform how a firm creates value for its customers and other stakeholders. It is a crucial journey for the prosperity of a firm (organization), the focus of this article, and the prosperity of cities, regions, and countries. There is a clear need for additional research that explains the what, why, and how of digital transformation. Moreover, there is a need for more research insight into the design of novel scalable and adaptive Sustainable Business Models to maximize the impact of digital transformation.

Conflicts of Interest: The author declares no conflict of interest.

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