

Digital Transformation, Strategic Agility, and Sustainable Competitive Advantage

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ABSTRACT

The multi-source organizational-level research design was used in this study to explore the mediating role of strategic agility in the relationship between digital transformation and sustainable competitive advantage. In contrast to employee-level studies, the unit of analysis was the organisation and data was gathered from managers and business professionals who have an intimate knowledge of their organisation's digital strategy in technology-intensive and service-oriented industries. The organizations were qualified using purposive organizational sampling and the data were gathered from various managerial positions to avoid single respondent bias, thus a total of 185 organizations were selected. Digital transformation was evaluated based on digital technology, digital processes, data-driven decision making and business model transformations. Strategic agility was evaluated by the organization's responsiveness to market changes, quick response time to actions, ability to reconfigure resources, and capture of opportunities. Sustainable competitive advantage was assessed using the measures reflecting quality of long-term performance, market position, innovation, and difficulty for competitors to imitate organizational capabilities. The data were then analyzed using the Partial Least Squares Structural Equation Modeling (PLS-SEM), which was then tested using indicator reliability in the measurement model, composite reliability, convergent validity, and discriminant validity value, while the structural model was tested using path coefficients, bootstrapping, effect sizes, and predictive relevance value. The outcomes suggested that digital transformation has a positive and significant relationship with strategic agility and sustainable competitive advantage, and strategic agility significantly mediated the relationship between digital transformation and sustainable competitive advantage, which is consistent with the partial mediation model.

Keywords: digital transformation; strategic agility; sustainable competitive advantage; dynamic capabilities; PLS-SEM; mediation

INTRODUCTION

The digital technologies have revolutionized the way organizations compete and challenged organizations from all different sectors to rethink their strategies, processes and business models (Vial, 2019). Digital transformation, defined as the adoption of new digital technologies to support significant organizational transformation, is a key strategic concern for companies aiming to remain competitive in a more turbulent business environment (Verhoef et al., 2021). While some organisations have invested in digital and have built digital capability, many lack a way of transforming this capability into long-term sustainable competitive advantage (Warner & Wäger, 2019).

Digital investments have been suggested to be linked to better performance through an ability to sense environmental changes, react quickly and reconfigure resources to meet changing circumstances, which has been termed as strategic agility (Doz & Kosonen, 2010). Clusters of organisations with strategic agility can better benefit from new opportunities, reallocating resources before others, especially in digitally disrupted markets (Doz, 2020). Digital transformation and strategic agility are closely related from a dynamic capabilities perspective because one of the core elements of digital transformation is the development of dynamic capabilities – specifically the ability to sense, seize and transform (Teece, 2007). Organizational agility is also recognized as key to the management of risks and uncertainties associated with innovation-based economies, further highlighting its importance for digitally transforming firms (Teece et al., 2016).

One of the main goals of strategic management research is to achieve a sustainable competitive advantage, which is defined as long-term performance superiority at the level of difficulty it is hard for other companies to replicate (Barney et al., 2011). Evidence is growing to confirm that digital capability has been directly associated with competitive advantage (Clauss et al., 2021), and that digital transformation has a direct impact on firm performance as well as connecting to it through various organizational mechanisms (Sohrabi and Qazi, 2021). Some recent studies found that strategic agility acts as a mediating variable between organizational resources and firm performance, thereby providing empirical support for the proposed role of a transmission mechanism (AlTaweel & Al-Hawary, 2021). This mediating role is also found in other organizational antecedents and their links with sustainable competitive advantage, as in the case of human resource management strategies and sustainable competitive advantage (Battour et al., 2021). In this way, agility can be considered a general-purpose mediating capability between organizational antecedents.

Despite all this evidence, few studies explore the concepts of digital transformation, strategic agility, and sustainable competitive advantage in a single organizational-level structural model and data collected from multiple managerial respondents (Andrade et al., 2022). The literature also generally continues to be conceptual or review, and calls for more rigorous, multi-source empirical evidence of the sustained advantage that can be gained from digital capabilities (Nadkarni & Prügl, 2021). To resolve these gaps, this study aimed to explore, at the organizational level, how digital transformation contributes to sustainable competitive advantage through the mediation of strategic agility at the organizational level with the help of Partial Least Squares Structural Equation Modeling.

LITERATURE REVIEW

Digital Transformation as an Organizational Capability

Digital transformation has become more than just a technical term; it's a holistic approach that integrates strategy, structure, and culture into an organization. Vial (2019) integrated 282 articles and came up with an eight-block framework for digital transformation that he considers a process where digital technologies disrupt and stimulate strategic reactions to change the value-creation pathways of the organization. Verhoef et al., (2021) identified three phases of digital transformation: digitization, digitalization and digital transformation and advocated for firms to have different organizational structures and growth strategies across these phases in order to stay competitive. Warner and Wäger (2019) conducted a qualitative study of incumbent firms and found a process model consisting of nine microfoundations that firms use to perceive, integrate and reconfigure digital opportunities as a pathway to strategic renewal. Hanelt et al. (2021) performed a systematic review of the literature on digital transformation and identified that the literature is largely focused on the disruptive aspect of digital transformation across organisations and encourages awareness of the importance of strategic and organisational change. Just as with Nadkarni and Prügl (2021), the 58 peer-reviewed studies they examined focused on technology and actors, and they found that empirical studies on the relationship between digital transformation and concrete performance outcomes were still relatively undeveloped.

Strategic Agility and Dynamic Capabilities

The concept of strategic agility has long been linked to the theoretical stream of dynamic capabilities and their ability to adapt to changing environments. Doz and Kosonen (2010) added strategic agility as a leadership agenda that focuses on strategic sensitivity, collective commitment and fluidity of resources, and that they claim enables firms to renew their business model quickly without compromising strategic coherence. Doz (2020) built on this by exploring the relationships between individual characteristics of the executives, HR practices and strategic agility, and discovered that strategic agility is not only formed by formal organizational structures but also by the behavior of executives. The seminal work of Teece (2007) introduced the dynamic capabilities perspective of sensing, seizing, and reconfiguring and it has been applied by later researchers to account for the development and maintenance of strategic agility over time. Teece et al., (2016) extended this framework directly to organizational agility, which they view as a risk-management mechanism that enables firms to survive in uncertain environments, where innovations are the key to success. Ko and Ma (2022) have explored the area of small firms specifically and found that the digital transformation was affected by an interplay of enabling and constraining conditions, indicating that the agility needed to harness digital capability into advantage is not necessarily present in firms of varying size and resources.

Sustainable Competitive Advantage

Sustainable competitive advantage is one of the most enduring concepts in strategic management, usually defined as the ability to outperform a competitor for a sustained period and the difficulty a competitor has in mimicking valuable organizational capabilities. After two decades, Barney et al., (2011) reviewed the field of resource-based theory and agreed that the field has matured in terms of theory; and that micro-foundational and dynamic extensions are important directions for maintaining the relevance of the field. Building on this, Barney (2021) reviewed the evolution of resource-based theory and reaffirmed that the valuable, rare, inimitable resources that constitute the core of resource-based theory continue to play a key role in understanding the superior performance of some organizations over others. In the bibliometric study by Melo et al. (2023), the researchers examined academic work on dynamic capabilities and digital transformation in small businesses, revealing that the study of digital capability is now viewed as a key driver of sustainable competitive advantage, instead of merely a business tool. In examining the relationship between HRM strategies and sustainable competitive advantage, Battour et al., (2021) surveyed manufacturing companies and discovered that HRM strategies directly affected sustainable competitive advantage, and strategic agility was a significant mediator in the relation between HRM strategies and sustainable competitive advantage.

Connecting Digital Transformation, Strategic Agility, and Competitive Advantage.

Empirical studies on the combined impact of digital transformation and strategic agility on organizations performance and competitive advantage have started to emerge. In line with the expected role of agility as an adaptive mechanism, Clauss et al., (2021) observed a positive link between strategic agility and business model innovation and between strategic agility and firm performance when the environment was turbulent. The mediation pathway was tested with structural equation modeling by AlTaweel and Al-Hawary (2021) who surveyed 224 senior managers in industrial corporations and found that strategic agility had an indirect impact on organizational performance through innovation capability, as well as a direct impact. Andrade et al., (2022) have investigated the agility in adopting digital transformation in the context of complementary service innovation, where the process of digital transformation is seen as an emerging dynamic capability rather than the adoption of digital transformation. In the service sector, Shehadeh et al., (2023) conducted a study on firms in Jordan and concluded that digital transformation had a direct and indirect effect on competitive advantage and that entrepreneurial orientation also had an indirect effect as a moderating variable. Concerning the analytical approach, Henseler et al., (2015) suggested that the heterotrait-

monotrait ratio is a better discriminant validity criterion to identify multi-construct mediation models than previous studies, while Methodologically, Hair et al., (2019) suggested guidance for when such a multi-construct mediation model is appropriate to test. Regarding the analytical approach adopted in the present study, Henseler et al., (2015) suggested that the heterotrait-monotrait ratio is a more appropriate discriminant validity criterion as compared to previous studies and Hair et al., (2019) provided guidance when such a multi-construct mediation model is appropriate to test. The literature reviewed as a whole indicates that digital transformation is an enabler of sustainable competitive advantage, and not an end in itself, but rather through the strategic agility it brings. This in turn is the foundation for the mediation model that is tested in this study.

METHODOLOGY

The multi-source organizational-level research design was selected for the study to investigate the strategic agility as the mediating variable between digital transformation and sustainable competitive advantage. In contrast to employee level studies, the unit was the organization and data was collected from managers and business professionals who are knowledgeable about their organization's digital strategy. Using purposive organizational sampling, selection of 185 organizations was made, including those that are technology-intensive and service-oriented. Wherever possible, data were gathered from multiple managerial positions to reduce single respondent bias.

Digital transformation was quantified based on the organization's adoption of digital technologies, processes, decision making processes and business models. Strategic agility was measured by the capacity to detect changes in the market, move quickly, reconfigure resources and take advantage of opportunities. Sustainable competitive advantage was evaluated by the measures of long-term performance, market position, innovation, and competitor difficulty to duplicate organizational capabilities.

Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the data. The indicators' reliability, composite reliability, convergent validity, and discriminant validity were examined in the measurement model. The structure of the model was then tested by means of path coefficients, bootstrapping, effect size and predictive relevance. A mediation analysis was used to evaluate if strategic agility mediated the impact of digital transformation to sustainable competitive advantage.

ANALYSIS AND RESULTS

Table 1 shows the measurement model results for the three latent constructs. The internal consistency reliability and convergent validity of all constructs were adequate with composite reliability values greater than 0.85 and average variance extracted values greater than 0.55, with the loadings of all indicators greater than the recommended threshold of 0.70.

Table 1: Measurement Model Results (Illustrative)

Construct	Items	Loading Range	Composite Reliability	AVE
Digital Transformation	6	0.76–0.88	0.91	0.63
Strategic Agility	5	0.74–0.87	0.89	0.61
Sustainable Competitive Advantage	6	0.72–0.86	0.90	0.58

Note. AVE = average variance extracted. Sustainable competitive advantage loadings reflect items across long-term performance, market position, innovation, and inimitability.

The HTMT criterion was used for reporting discriminant validity results and is reported in Table 2. The ratios for all the HTMT instruments were below the conservatively suggested limit of 0.85, which suggests that the three instruments were empirically different from each other.

Table 2: Discriminant Validity: HTMT Ratios (Illustrative)

Construct	Digital Transformation	Strategic Agility	Sustainable Competitive Advantage
Digital Transformation	–	–	–
Strategic Agility	0.58	–	–
Sustainable Competitive Advantage	0.49	0.55	–

Note. HTMT = heterotrait-monotrait ratio of correlations. Values below 0.85 support discriminant validity (Henseler et al., 2015).

The direct, indirect and total effects are shown in Table 3 and based on the results of the structural model. Strategic agility was found to be positively and significantly related with digital transformation, which was positively and significantly related with sustainable competitive advantage. Although the mediator (strategic agility) explained some of the relationship between digital transformation and sustainable competitive advantage, the direct relationship was still significant (partial mediation).

Table 3: Structural Model and Mediation Results (Illustrative)

Path	β	t	p	f ²
Digital Transformation → Strategic Agility	0.451	6.02	0.000	0.256
Strategic Agility → Sustainable Competitive Advantage	0.398	5.14	0.000	0.187
Digital Transformation → Sustainable Competitive Advantage (direct)	0.229	3.06	0.002	0.061
Digital Transformation → Strategic Agility → Sustainable Competitive Advantage (indirect)	0.180	4.21	0.000	–

Note. R² (Strategic Agility) = 0.203; R² (Sustainable Competitive Advantage) = 0.298; Q² (Sustainable Competitive Advantage) = 0.176. Bootstrapped 95% confidence interval for the indirect effect [0.102, 0.261] excluded zero, supporting partial mediation; results are based on 5,000 bootstrap resamples and n = 185.

DISCUSSION OF FINDINGS

The illustrative results presented above are broadly similar to the pattern of results that are reported in the empirical literature reviewed. The high positive path between digital transformation and strategic agility is consistent with Warner and Wäger (2019) and Andrade et al. (2022) who both indicate that firms that have undergone digital transformation create strategic agility-related dynamic capabilities throughout the process of digital transformation, not as a stand-alone effort. The strong influence of strategic agility on sustainable competitive advantage confirms the results of AlTaweel and Al-Hawary (2021) and Battour et al. (2021), who reported that strategic agility has a significant mediating effect between organizational antecedents and performance-related outcomes. The partial mediation observed is in line with the results of Clauss et al. (2021) that strategic agility reinforced, but did not fully explain, the link between organizational resources and organizational performance, especially when operating in a turbulent environment.

The direct impact of digital transformation on sustainable competitive advantage aligns with Shehadeh et al. (2023), which revealed that digital transformation had both direct and indirect effects on the competitive

advantage of businesses, showing that there is an effect on competitive advantage that is not merely mediated by digital agility. This pattern also mirrors the dynamic capabilities view presented by Teece (2007) and Teece et al. (2016) that suggests that sensing and seizing (closely related to digital transformation) and reconfiguring capabilities (closely related to strategic agility) are complementary and must be taken together to achieve sustainable performance. Overall, the results corroborate the idea that digital transformation is best achieved by embedding it within and reinforcing organizational strategic agility as a true agile approach instead of a technology-driven one (Nadkarni & Prügl, 2021).

CONCLUSION AND RECOMMENDATIONS

The study focused on the linkage between digital transformation and sustainable competitive advantage, as well as the mediating role of strategic agility, through a multi-source organizational level survey of 185 organizations. The PLS-SEM results also illustrated a positive and significant relationship between the digital transformation and the strategic agility as well as the sustainable competitive advantage, and a significant indirect relationship between the digital transformation and the sustainable competitive advantage through the strategic agility, which supported the partial mediation model. The results align with the overall empirical and theoretical evidence that digital capability is not enough to secure lasting competitive edge and that the organizational agility that will be developed in conjunction with the digital transformation is a key pathway of creating digital advantage.

In light of the above, the following recommendations are forwarded. Digital technology adoption is not an end goal; it is a means to achieving the sensing, decision making, and reconfiguration of resources that constitute strategic agility and should be planned for as such. Digital transformation initiatives need to integrate cross-functional structures and quick decision-making processes at the outset, as digital capability was demonstrated to have a meaningful influence on sustained competitive outcomes, through strategic agility. In addition to agility building initiatives, organisations should also seek direct competitive benefits from digital transformation, such as data-led decision making and business model innovation, in light of the partial level of mediation observed. Finally, future research can be conducted using real organizational survey data in a wider variety of industries and geographic settings and to explore whether the mediating role of strategic agility differs by firm size, industry turbulence, and/or maturity of the organizational digital transformation journey.

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