

Digital Transformation and Firm Performance: The Mediating Role of Human-Centric Capabilities

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Abstract

In today's digital economy, organizations increasingly adopt advanced technologies to improve efficiency and competitiveness; however, technology implementation alone does not always lead to better performance outcomes. The aim of this study is to explore how digital transformation contributes to firm performance by emphasizing the role of human-centric capabilities. The main objective is to examine whether capabilities such as employee digital competence, leadership support, and a collaborative work culture mediate the relationship between digital transformation and organizational performance. A quantitative research approach was employed, and primary data were collected from 200 respondents, including managers and employees from different industries, through a structured questionnaire using a five-point Likert scale. Structural Equation Modeling (SEM) was applied as the sole analytical technique to test the proposed relationships and mediation effect. The results show that digital transformation positively influences human-centric capabilities, which subsequently lead to significant improvements in firm performance, while the direct impact of digital transformation alone is relatively limited. The conclusion suggests that organizations can achieve sustainable performance benefits only when technological initiatives are supported by skilled employees and a supportive organizational environment. The study highlights the importance of integrating people-focused strategies with digital investments for long-term success.

Keywords: Digital transformation, firm performance, human-centric capabilities, mediation, structural equation modelling

1. Introduction

The rapid growth of digital technologies has fundamentally transformed the way organizations design strategies, manage operations, and deliver value to customers. Technologies such as cloud computing, artificial intelligence, big data analytics, and process automation have enabled firms to enhance operational efficiency, improve decision-making, and respond more effectively to dynamic market conditions (Vial, 2019; Bharadwaj et al., 2013). As a result, digital transformation has evolved beyond a technological upgrade and is increasingly viewed as a strategic imperative for achieving long-term competitiveness and organizational sustainability (Westerman, Bonnet, C McAfee, 2014).

Despite substantial investments in digital tools and infrastructure, many organizations fail to achieve significant performance improvements. Prior research suggests that technology adoption alone does not guarantee success, as the value derived from digital initiatives depends largely on how effectively employees adopt, utilize, and integrate these technologies into daily work processes (Kane et al., 2015). In this context, human-centric capabilities—including employee digital skills, continuous training, leadership support, collaboration, and an adaptive organizational culture—play a critical role in converting digital investments into tangible business outcomes (Verhoef et al., 2021). Without adequate human readiness, even advanced digital technologies may remain underutilized and fail to generate expected performance gains.

Although existing studies have examined the relationship between digital transformation and firm performance, limited empirical research has focused on the underlying mechanisms through which human-related factors influence this relationship. Understanding the mediating role of human-centric capabilities is therefore essential for both theoretical advancement and managerial practice (Vial, 2019). Addressing this research gap, the present study investigates the impact of digital transformation on firm performance and examines whether human-centric capabilities act as a mediating mechanism between the two.

Using a quantitative research design, data were collected from 200 respondents across various industries and analyzed using Structural Equation Modeling (SEM) to test the proposed relationships. By emphasizing the human dimension of digital transformation, this study contributes to the digital strategy literature and

provides practical insights for organizations seeking to achieve sustainable performance improvements in the digital era.

2. Background

The business environment has undergone significant transformation with the emergence of digital technologies that are redefining organizational processes, structures, and competitive strategies. Over the past decade, advancements in cloud computing, artificial intelligence, data analytics, and enterprise systems have encouraged firms to digitize operations and adopt technology-driven business models (Bharadwaj et al., 2013; Vial, 2019). These developments have enabled organizations to improve efficiency, reduce costs, enhance customer engagement, and accelerate innovation, positioning digital transformation as a key driver of organizational growth and sustainability across industries (Westerman, Bonnet, C McAfee, 2014).

However, the outcomes of digital initiatives vary considerably among firms. While some organizations achieve significant performance improvements, others experience limited or inconsistent benefits despite comparable technological investments. This variation suggests that technology adoption alone is insufficient to guarantee success (Kane et al., 2015). Consequently, research attention has increasingly shifted toward the human and organizational dimensions of digital transformation. Employees' ability to effectively use digital tools, leadership commitment to change, continuous training, and a culture that supports learning and collaboration are widely recognized as critical enablers of successful digital initiatives (Verhoef et al., 2021).

Human-centric capabilities play a crucial role in bridging the gap between technological implementation and performance improvement. Skilled and adaptable employees enable organizations to integrate digital systems into operational workflows, foster innovation, and respond effectively to rapidly changing market demands (Vial, 2019). In contrast, resistance to change, lack of digital competencies, and insufficient leadership support can limit the effective utilization of digital resources and reduce potential performance gains (Westerman et al., 2014). As a result, firms that prioritize technological upgrades without simultaneously investing in human capital development may fail to realize the full value of their digital investments.

Given these considerations, it is important to understand how human-oriented capabilities influence the relationship between digital transformation and firm performance. Building on this perspective, the present study examines whether human-centric capabilities act as a mediating mechanism explaining how digital initiatives translate into improved organizational outcomes. By empirically testing this relationship using Structural Equation Modeling (SEM), the study contributes to a deeper understanding of the socio-technical nature of digital transformation and offers insights into how organizations can align technological and human resources to achieve sustainable performance improvements.

3. Objective and Hypotheses Objective of the Study

To examine the impact of digital transformation on firm performance and to determine the mediating role of human-centric capabilities in this relationship using Structural Equation Modeling (SEM).

Hypotheses

H1: Digital transformation has a positive and significant effect on firm performance.

H2: Digital transformation has a positive and significant effect on human-centric capabilities.

H3: Human-centric capabilities have a positive and significant effect on firm performance.

H4: Human-centric capabilities mediate the relationship between digital transformation and firm performance.

Conceptual Model:



Figure 1: Conceptual Model

4. Literature Review

Digital transformation has emerged as a central theme in contemporary management research due to its potential to reshape organizational structures, processes, and competitive strategies. Organizations increasingly integrate technologies such as cloud computing, artificial intelligence, big data analytics, and automation to enhance operational efficiency and customer value (Bharadwaj et al., 2013; Vial, 2019). Prior studies indicate that digital transformation supports faster decision-making, cost reduction, improved service delivery, and innovation, thereby contributing to superior organizational performance. Firms that effectively adopt digital technologies often exhibit greater flexibility and responsiveness in highly dynamic market environments (Westerman et al., 2014).

Despite these opportunities, empirical evidence suggests that technological adoption alone does not guarantee improved performance outcomes. Several organizations fail to achieve anticipated benefits due to underutilization or poor integration of digital tools into daily operations (Kane et al., 2015). This limitation highlights the importance of the human and organizational context in which digital technologies are implemented. Consequently, scholars increasingly argue that digital transformation should be conceptualized as a socio-technical process, rather than a purely technological change (Vial, 2019; Verhoef et al., 2021).

Human-centric capabilities have therefore gained increasing attention in organizational research. These capabilities include employee digital competencies, continuous learning, leadership commitment, collaboration, and an organizational culture that supports innovation and change. Employees possessing strong digital skills are better positioned to leverage technological tools, adapt to new systems, and contribute to process improvements (Verhoef et al., 2021). Similarly, supportive leadership and collaborative environments facilitate knowledge sharing and the effective implementation of digital initiatives (Westerman et al., 2014). Empirical studies show that organizations investing in employee training and capability development experience higher levels of productivity, innovation, and overall performance (Kane et al., 2015).

From a theoretical standpoint, the Resource-Based View (RBV) posits that unique and valuable human resources serve as strategic assets capable of generating sustained competitive advantage (Barney, 1991). Within the context of digital transformation, human capital functions as a critical resource that enables firms to convert technological investments into tangible performance outcomes. Without skilled employees and appropriate organizational support, digital technologies may fail to create value, suggesting that human-centric capabilities act as a mediating mechanism linking digital transformation to firm performance (Vial, 2019).

Despite growing recognition of these relationships, limited empirical studies have simultaneously examined digital transformation, human-centric capabilities, and firm performance within a single integrated framework using advanced statistical techniques. To address this gap, the present study applies

Structural Equation Modeling (SEM) to test both direct and indirect relationships, providing a comprehensive understanding of how human-centric capabilities explain the performance effects of digital transformation.

5. Research Methodology Research

Design

This study adopts a quantitative and explanatory research design to examine the relationship between digital transformation and firm performance and to assess the mediating role of human-centric capabilities. A survey-based approach was selected to collect measurable and standardized responses from participants across organizations.

Data Collection

Primary data were gathered using a structured questionnaire. The instrument consisted of close-ended statements measured on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire was designed to capture respondents' perceptions regarding digital initiatives, employee capabilities, and organizational performance.

Sample and Respondents

The study sample comprised **200 respondents**, including managers, supervisors, and employees working in manufacturing and service sector organizations. Respondents were selected using convenience sampling due to accessibility and time constraints. Participants were chosen based on their involvement in digital processes or organizational decision-making to ensure informed responses.

Measurement of Constructs

Three key constructs were measured:

- **Digital Transformation (DT):** adoption of digital technologies, automation of processes, integration of digital systems, and data-driven decision-making
- **Human-Centric Capabilities (HCC):** employee digital skills, training support, leadership commitment, collaboration, and adaptability
- **Firm Performance (FP):** productivity improvement, profitability growth, innovation, and customer satisfaction

All measurement items were adapted and refined from established management and digital transformation studies to ensure content validity.

Data Analysis Technique

Structural Equation Modeling (SEM) was employed as the sole analytical technique to test the hypothesized relationships and mediation effects. SEM enables simultaneous assessment of measurement reliability and structural relationships among constructs. The analysis included:

- Reliability testing (Cronbach's alpha)
- Measurement model evaluation
- Structural path analysis
- Mediation testing

Statistical analysis was conducted using SPSS and AMOS/SmartPLS software.

Data Analysis and Results

Structural Equation Modeling (SEM) was employed to test the proposed relationships among digital transformation, human-centric capabilities, and firm performance. Data were collected from **200 respondents** using a structured questionnaire measured on a five-point Likert scale.

Reliability and Validity Analysis

The reliability of the measurement scales was assessed using **Cronbach's alpha**. All constructs exceeded the recommended threshold of 0.70, indicating strong internal consistency. Convergent and discriminant validity were confirmed through significant factor loadings and construct distinctiveness.

Table 1: Reliability Statistics

Construct	Number of Items	Cronbach's Alpha
Digital Transformation	5	0.81
Human-Centric Capabilities	6	0.86
Firm Performance	5	0.83

Source: Primary Data Analysis

Measurement Model Results

All observed variables loaded significantly on their respective latent constructs, with standardized factor loadings above acceptable limits. This confirms that the measurement model adequately represents the underlying constructs.

Table 2: Measurement Model Summary

Construct	Standardized Factor Loadings (Range)	Validity Status
Digital Transformation	0.68 - 0.84	Accepted
Human-Centric Capabilities	0.71 - 0.88	Accepted
Firm Performance	0.69 - 0.85	Accepted

Structural Model Results

The structural model was analyzed to test the hypothesized relationships. Digital transformation exhibited a **positive but weak direct effect** on firm performance. However, it showed a **strong and significant effect** on human-centric capabilities. Human-centric capabilities, in turn, had a **strong positive impact** on firm performance.

Table 3: Structural Path Results

Hypothesis Path	Standardized Coefficient	Result
H1 Digital Transformation → Firm Performance	0.18	Partially Supported
H2 Digital Transformation → Human-Centric Capabilities	0.62	Supported
H3 Human-Centric Capabilities → Firm Performance	0.54	Supported

Mediation Analysis

The mediation effect was examined by introducing human-centric capabilities as an intervening variable. The results indicate that the indirect effect of digital transformation on firm performance through human-centric capabilities is significant, while the direct effect is reduced in strength. This confirms **partial mediation**.

Table 4: Mediation Effect Results

Relationship	Direct Effect	Indirect Effect	Mediation Type
Digital Transformation → Firm Performance	Weak	Significant	Partial Mediation

Hypotheses Testing Summary

Table 5: Summary of Hypotheses Testing

Hypothesis Description	Status
H1 Digital transformation positively affects firm performance	Partially Supported
H2 Digital transformation positively affects human-centric capabilities	Supported
H3 Human-centric capabilities positively affect firm performance	Supported
H4 Human-centric capabilities mediate the relationship	Supported

Discussion and Findings

This study examined the relationship between digital transformation and firm performance, with a specific focus on the mediating role of human-centric capabilities. The findings provide empirical evidence that digital transformation alone does not substantially enhance firm performance unless supported by strong human-oriented capabilities.

The results indicate that the **direct impact of digital transformation on firm performance is positive but weak**, suggesting that technology adoption by itself is insufficient to generate significant performance improvements. This finding aligns with prior research that emphasizes the limitations of technology-driven strategies when organizational readiness and employee capabilities are overlooked.

A key finding of the study is the **strong and significant relationship between digital transformation and human-centric capabilities**. Organizations that actively invest in digital technologies also tend to develop employee digital skills, leadership support, and collaborative work environments. This highlights that digital initiatives often act as catalysts for organizational learning and capability development.

Furthermore, **human-centric capabilities were found to have a strong positive effect on firm performance**. Firms with digitally skilled employees, supportive leadership, and an adaptive culture reported higher productivity, innovation, and customer satisfaction. This reinforces the argument that human capital plays a critical role in translating technological investments into tangible business outcomes.

The mediation analysis confirms that **human-centric capabilities partially mediate the relationship between digital transformation and firm performance**. This indicates that the performance benefits of digital transformation are largely realized through improved employee competencies and organizational support mechanisms rather than through technology alone. The findings support the resource-based view, which identifies human capabilities as strategic assets that enable firms to achieve sustainable competitive advantage.

Overall, the study demonstrates that **digital transformation is a socio-technical process**, where human-centric capabilities function as a key mechanism linking technology adoption to firm performance. Organizations seeking to improve performance through digital initiatives must therefore prioritize workforce development alongside technological investments.

Key Findings

- Digital transformation has a **limited direct effect** on firm performance.
- Digital transformation **significantly enhances human-centric capabilities**.
- Human-centric capabilities have a **strong positive impact** on firm performance.
- Human-centric capabilities **partially mediate** the digital transformation–performance relationship.
- People-focused strategies are essential for realizing the full benefits of digital transformation.

Conclusion and Future Scope

This study investigated the impact of digital transformation on firm performance, with particular emphasis on the mediating role of human-centric capabilities. Using Structural Equation Modeling (SEM) and data collected from 200 respondents across manufacturing and service sectors, the findings reveal that digital transformation alone has a limited direct effect on firm performance. Instead, its effectiveness largely depends on the extent to which organizations develop employee digital skills, leadership support, and a collaborative organizational culture.

The results confirm that human-centric capabilities play a crucial mediating role in translating digital initiatives into tangible performance outcomes. Firms that integrate technological investments with workforce development are more likely to achieve improvements in productivity, innovation, and customer satisfaction. This highlights that digital transformation should be approached as a socio-technical process rather than a purely technological change. By emphasizing the human dimension, the study contributes to existing literature by providing empirical evidence on how people-oriented capabilities enhance the performance impact of digital transformation.

Future Scope

While this study offers valuable insights, several avenues for future research remain. First, future studies may employ a **longitudinal research design** to examine the long-term effects of digital transformation and capability development over time. Second, expanding the sample size and including **industry-specific or cross-country comparisons** could improve the generalizability of the findings. Third, future research may incorporate additional mediating or moderating variables such as organizational culture, innovation capability, or leadership style to further explain performance variations. Finally, qualitative approaches or mixed-method studies could provide deeper insights into how human-centric capabilities are developed and sustained during digital transformation initiatives.

References

1. Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
2. Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly*, 37(2), 471–482.
3. Brynjolfsson, E., & Hitt, L. M. (2000). Beyond computation: Information technology, organizational transformation and business performance. *Journal of Economic Perspectives*, 14(4), 23–48.
4. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W. W. Norton & Company.
5. Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2015). Strategy, not technology, drives digital transformation. *MIT Sloan Management Review*.
6. Kane, G. C., Phillips, A. N., Copulsky, J., & Andrus, G. (2019). *The technology fallacy: How people are the real key to digital transformation*. MIT Press.

7. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, 28(2), 118–144.
8. Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889–901.
9. Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation*. Harvard Business Review Press.
10. Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
11. Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, 51(1), 40–49.
12. El Sawy, O. A., Kraemmergaard, P., Amsinck, H., & Vinther, A. L. (2016). How LEGO built the foundations and enterprise capabilities for digital leadership. *MIS Quarterly Executive*, 15(2), 141–166.
13. Porter, M. E., & Heppelmann, J. E. (2014). How smart, connected products are transforming competition. *Harvard Business Review*, 92(11), 64–88.
14. Sebastian, I. M., Ross, J. W., Beath, C., Mocker, M., Moloney, K., & Fonstad, N. O. (2017). How big old companies navigate digital transformation. *MIS Quarterly Executive*, 16(3), 197–213.
15. Helfat, C. E., & Peteraf, M. A. (2003). The dynamic resource-based view: Capability lifecycles. *Strategic Management Journal*, 24(10), 997–1010.
16. Gupta, S., Drave, V. A., & Jain, R. (2023). Digital transformation and firm performance: Examining the role of organizational culture. *Technological Forecasting and Social Change*, 186, 122160.
17. Mikalef, P., Boura, M., Lekakos, G., & Krogstie, J. (2019). Big data analytics and firm performance: The mediating role of dynamic capabilities. *Information & Management*, 56(8), 103207.
18. Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management: Reinventing innovation management research. *MIS Quarterly*, 41(1), 223–238.
19. Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research commentary—The new organizing logic of digital innovation. *Information Systems Research*, 21(4), 724–735.
20. Kraus, S., Durst, S., Ferreira, J. J., Veiga, P., Kailer, N., & Weinmann, A. (2022). Digital transformation in business and management research. *Journal of Business Research*, 149, 47–56.
21. Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation. *Long Range Planning*, 52(3), 326–349.
22. OECD. (2020). *Digital transformation in the age of COVID-19: Building resilience and bridging divides*. OECD Publishing.
23. Chen, D. Q., Preston, D. S., & Swink, M. (2015). How the use of big data analytics affects value creation. *Journal of Management Information Systems*, 32(4), 4–39.
24. Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation. *Journal of Management Studies*, 58(5), 1159–1197.
25. Reis, J., Amorim, M., Melão, N., & Matos, P. (2018). Digital transformation: A literature review and guidelines for future research. *World Conference on Information Systems and Technologies*, Springer.

