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Firm Performance Driven by Digital Technology: The Mediating Role of Strategy and Innovation

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Abstract

The role of digital technology in shaping business outcomes has been widely examined in both scholarly and industry contexts. Within this framework, firm performance is increasingly linked to how digital transformation strategies and organizational innovation are enabled by the use of digital technologies. This research explores the mediating influence of digital transformation strategy and organizational innovation on the connection between digital technology adoption and firm performance. To investigate this relationship, a survey was conducted among supervisors working in Taiwan's financial sector, with responses collected from 227 firms. The empirical findings demonstrate that digital technology usage positively contributes to the development of digital transformation strategies and fosters organizational innovation. These elements, in turn, enhance firm performance. Moreover, the analysis highlights that both digital transformation strategy and organizational innovation act as full mediators in the pathway between digital technology adoption and firm performance. The study provides valuable insights into the mechanisms through which digital technologies can strengthen organizational competitiveness and performance outcomes.

Keywords: digital technology usage; digital transformation strategy; organizational innovation; firm performance; financial industry

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1. Introduction

In the twenty-first century, the significance of digital technologies has become increasingly evident. The integration of digital tools in business operations has played a crucial role in shaping management, service delivery, production processes, overall performance, and productivity improvements. Key areas where digital technologies are

creating strong impacts include supply chain networks, robotics, adaptive manufacturing methods, product customization, and procurement efficiency (Johnson, 2021). Consequently, many organizations perceive investment in digital technologies as a strategic response to enhance competitiveness, strengthen profitability, and improve operational quality (Nambisan, Wright, & Feldman, 2019). Despite this recognition, the empirical relationship between digital technology usage and firm performance remains insufficiently explored, particularly within the digital context, making it necessary to investigate the link more directly.

The urgency of digital transformation (DT) has also intensified for organizations worldwide (McKinsey, 2020). Leveraging DT opportunities is now one of the most pressing priorities for modern firms. The term DT has become widely adopted in business discourse, describing both the disruptive influence of digital technologies and the need for firms to reconfigure themselves to remain competitive in the digital era (Venkatraman, 2017). However, DT continues to be underexamined in both theoretical and practical domains (Vial, 2019). Questions persist regarding how organizations should best formulate and implement a digital transformation strategy. Although DT frameworks have been outlined (Matt, Hess, & Benlian, 2015; Vial, 2019), this study suggests that examining digital technology usage directly may provide further insights into how such strategies are shaped.

At the same time, the rise of new digital platforms, infrastructures, and advanced technologies has reshaped innovation, influencing both organizational practices and policy directions (Nambisan et al., 2017). Digital technologies are redefining the processes of creating products and services, yet empirical studies on organizational innovation from the lens of digital technology usage remain scarce. Existing research lacks a comprehensive, empirically validated framework to explain the role of organizational innovation in linking digital technology usage to firm performance. This paper addresses that gap by analyzing the interconnections between these three domains.

Traditionally, digital technology usage, digital transformation strategy, and organizational innovation have evolved as separate areas of inquiry. Only a few scholars, such as Matt, Hess, and Benlian (2015) and Vial (2019), have proposed integrated DT frameworks to examine their relationships. Moreover, the adoption of digital technologies at the organizational level is still an underexplored field (Leonardi, 2013; Verstegen, Houkes, & Reymen, 2019). Building on the DT model advanced by Matt, Hess, and Benlian (2015) and Vial (2019), this study seeks to develop a more holistic perspective. Their framework emphasizes four interrelated dimensions: digital technology usage, strategic alignment (digital transformation strategy), organizational adaptation (organizational innovation), and performance outcomes (firm performance). Guided by this perspective, the present study aims to investigate how digital technology usage influences firm performance through the mediating roles of digital transformation strategy and organizational innovation. The proposed theoretical model is presented in Figure 1.

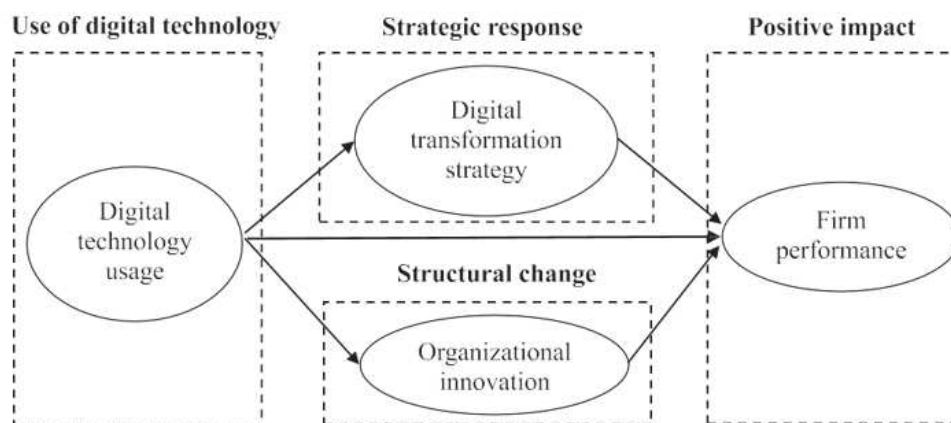


Figure 1. Theoretical model.

2. Materials and Methods

The role of digital technology in shaping organizational practices has been examined from various perspectives. Verstegen, Houkes, and Reymen (2019) highlight three main aspects of digital technology usage: the emergence of new organizational forms enabled by digital systems, the collective adoption of technologies to achieve shared goals, and the execution of digitally oriented innovation processes. Building on this foundation, the present study focuses on how organizations employ digital technologies through distributed, generative, and combinatorial mechanisms to create new ways of organizing, even though detailed analyses of such practices remain limited (Leonardi, 2013; Verstegen, Houkes, & Reymen, 2019). Consistent with Janssen et al. (2020), digital technology usage in this research is conceptualized through three dimensions: information exchange and transactions, distributed ledgers, and shared infrastructure. Information exchange involves transaction efficiency, scalability, and standardization, while distributed ledgers relate to data security, integrity, and novelty. Shared infrastructure refers to a firm's capacity to deliver services across the value chain, supported by standardized and well-developed systems.

The concept of digital transformation (DT) has gained attention as firms seek to reinvent themselves in response to technological disruptions (Nambisan, Wright, & Feldman, 2019). A digital transformation strategy serves to coordinate and prioritize organizational change, enabling firms to move from a pre-digital to a digitally integrated state (Matt, Hess, & Benlian, 2015; Hess et al., 2016). Such strategies extend across products, services, operations, and competitive landscapes (Fichman, Santos, & Zheng, 2014), and are often driven by the pervasiveness of digital technologies. Consequently, firms with higher levels of digital technology adoption are expected to develop stronger transformation strategies (Vial, 2019). At the same time, organizational innovation plays a complementary role, encompassing product and service innovation, process improvements, and managerial or administrative innovation (Baregheh, Rowley, & Sambrook, 2009; Damanpour, 2014). Innovation has recently been understood as a reconfiguration of structures and management practices aimed at enhancing knowledge, improving efficiency, and raising the quality of outputs (Wang & Chen, 2020). Drawing on Prange and Pinho (2017), organizational innovation in this study is framed across three areas: new methods and procedures, technology-enabled product and service innovation, and marketing innovation. Previous research indicates that digital technologies act as key enablers of such innovation by reshaping product and service creation processes (Nambisan, 2013; Nambisan et al., 2017) and by driving organizational change (Lyytinen & Rose, 2003).

Firm performance, in turn, is considered in terms of both financial and market dimensions (Hult, Hurley, & Knight, 2004; Kim & Lee, 2010; Wu et al., 2006). Financial performance can be evaluated through profitability, ROI, sales growth, and customer

retention, while market performance reflects entry into new markets, product success, and market share (Singh et al., 2019). Prior studies demonstrate that IT usage positively influences firm performance by transforming processes, structures, and infrastructure (Zhu et al., 2006; Zhu & Kraemer, 2005; Porter & Millar, 1985; Bharadwaj, 2000). Furthermore, scholars suggest that digital transformation strategies enable firms to leverage resources effectively, creating sustainable competitive advantage and long-term performance gains (Bharadwaj et al., 2013; Kane et al., 2017; Dalenogare et al., 2018; Vial, 2019; Tortorella et al., 2020). Organizational innovation has likewise been shown to enhance competitiveness and strengthen firm performance (Ahuja & Katila, 2001; Ho, 2011; Camisón & Villar-López, 2014). Taken together, these insights suggest that digital technology usage positively affects both digital transformation strategy and organizational innovation, which in turn mediate the relationship between technology adoption and firm performance (Matt, Hess, & Benlian, 2015; Vial, 2019).

To empirically test these relationships, this study was conducted within Taiwan's financial and industrial sectors. The sampling frame was based on the China Credit Information Service, which provides financial and corporate details of the top 5,000 firms in Taiwan in 2019. The financial industry was chosen for two reasons: the launch of the *"Building a Digital Financial Environment 3.0"* initiative by the Financial Supervisory Commission in 2015 to accelerate digital adoption in financial institutions, and the enactment of the *"Financial Science and Technology Development and Innovation Experiments Regulations"* in 2017, designed to support fintech growth. With the spread of mobile payments, cloud services, and AI applications, Taiwan's financial sector has become a relevant context for studying digital transformation and innovation.

Supervisors were identified as the primary respondents, as they are directly involved in digital adoption, strategy development, and innovation practices influencing performance outcomes. Their knowledge of organizational strategies and digital initiatives, combined with experience in implementing adoption projects, provided appropriate insights for this study. A stratified random sampling approach was employed, selecting 100 firms from each group of 1,000 within the top 5,000 list. A total of 500 questionnaires were distributed, specifically targeting supervisors familiar with digital usage, transformation, and innovation practices. All items were measured using five-point Likert scales ranging from "strongly disagree" to "strongly agree" (see Appendix). Since the instruments were originally in English, the translation-back translation procedure was used to ensure linguistic accuracy (Brislin, 1986). Of the 248 responses received, 21 were incomplete and discarded, leaving 227 valid questionnaires, which represents a usable response rate of 45%.

To test for potential nonresponse bias, independent t-tests were conducted between early respondents ($n = 140$) and late respondents ($n = 87$). No significant differences were found for firm age ($p = 0.240$), firm capital ($p = 0.572$), employee size ($p = 0.341$), or tenure ($p = 0.696$), indicating the absence of systematic bias. Descriptive statistics of the sample firms showed that 80.2% had been in operation for more than 20 years, 63.4% reported capital exceeding 350 million, and 59.9% employed more than 3,001 staff members. Among respondents, 5.7% were senior executives, 20.7% were middle managers, and 38.8% were frontline supervisors, with 20.7% reporting a tenure of 10–15 years. Because all data were collected from the same source, Harman's one-factor test (Podsakoff et al., 2003) was used to check for common method bias. Results showed that the first factor accounted for only 23.4% of the variance, while four factors together explained 76.6%, indicating that common method bias was not a significant issue.

Table 1. Demographics of the sample

Variable	Category	N	Rate (%)
Years of firm established	3 years and fewer	1	0.4
	Over 3 years to 5 years	5	2.2
	Over 5 years to 10 years	7	3.1
	Over 10 years to 15 years	10	4.4
	Over 15 years to 20 years	22	9.7
	Over 20 years	182	80.2
Firm capital (NT\$)	3.5 million and below	12	5.3
	Over 3.5 million to 35 million	14	6.2
	Over 35 million to 105 million	9	4.0
	Over 105 million to 175 million	17	7.5
	Over 175 million to 350 million	31	13.7
	Over than 350 million	144	63.4
Number of employees	Less than 100	14	6.2
	101–500	13	5.7
	501–1000	14	6.2
	1001–2000	28	12.3
	2001–3,000	22	9.7
	Over 3,001	136	59.9
Position	Senior Executive	13	5.7
	Middle level supervisor	47	20.7
	Grassroots supervisor	88	38.8
	Others	79	34.8
Tenures of Informants	3 years and fewer	34	15.0
	Over 3 years to 5 years	36	15.9
	Over 5 years to 10 years	39	17.2
	Over 10 years to 15 years	47	20.7

Variable	Category	N	Rate (%)
	Over 15 years to 20 years	26	11.5
	Over 20 years	45	19.8

3. Result

The reliability and validity of the measurement model were examined using Cronbach's alpha, composite reliability, and average variance extracted (AVE) (Fornell & Larcker, 1981). All constructs reported Cronbach's alpha values above the 0.70 threshold (Nunnally, 1978), confirming adequate internal consistency. Similarly, composite reliability values exceeded 0.70, while AVE values for each construct were greater than 0.50, indicating that over half of the variance in measurement items was explained (Bagozzi & Yi, 1988). Discriminant validity was further established as the square roots of AVEs, shown on the diagonal in Table 3, were higher than the correlations across constructs, supporting conceptual distinctiveness. Overall, the measures demonstrated unidimensionality, reliability, and validity. For hypothesis testing, partial least squares (PLS) analysis was applied to evaluate the proposed model. The results showed significant positive relationships between digital technology usage and digital transformation strategy ($\beta = 0.82$, $t = 35.95$, $p < 0.001$) as well as organizational innovation ($\beta = 0.80$, $t = 31.74$, $p < 0.001$), thereby supporting H1 and H2. Likewise, digital transformation strategy ($\beta = 0.30$, $t = 2.93$, $p < 0.01$) and organizational innovation ($\beta = 0.31$, $t = 3.21$, $p < 0.01$) were found to positively influence firm performance, confirming H3 and H4. In contrast, the direct effect of digital technology usage on firm performance was insignificant ($\beta = 0.18$, $t = 1.75$, $p > 0.05$), meaning H5 was not supported. Mediation analysis using a bootstrapping approach within the SEM framework (Zhao, Lynch Jr., & Chen, 2010) revealed significant indirect effects. Specifically, both the pathway through digital transformation strategy ($\beta = 0.23$, $p < 0.01$) and through organizational innovation ($\beta = 0.24$, $p < 0.001$) were significant, indicating that these two constructs act as full mediators in the relationship between digital technology usage and firm performance. Thus, H6 and H7 were strongly supported.

Table 2. Results of Measurement Properties

Construct name	Item	Factor loading	Cronbach alpha	Composite reliability	AVE	Source
Digital technology usage (formative second-order construct)	Information exchange and transactions (IET1)	0.85	0.83	0.89	0.67	Janssen et al. (2020)
	IET2	0.77				
	IET3	0.84				
	IET4	0.81				
Distributed ledger (DL)	DL1	0.92	0.89	0.93	0.82	
	DL2	0.91				
	DL3	0.88				

Construct name	Item	Factor loading	Cronbach alpha	Composite reliability	AVE	Source
Shared infrastructure (SI)	SI1	0.90	0.87	0.92	0.80	
	SI2	0.93				
	SI3	0.85				
Digital transformation strategy (DTS)	DTS1	0.94	0.93	0.94	0.88	Li et al. (2021)
	DTS2	0.95				
	DTS3	0.93				
Organisational innovation (OI)	OI1	0.92	0.92	0.95	0.83	Prange and Pinho (2017)
	OI2	0.92				
	OI3	0.91				
	OI4	0.89				
Firm performance (reflective second-order construct)	Financial performance (FIP1)	0.96	0.93	0.94	0.83	Singh et al. (2019)
	FIP2	0.94				
	FIP3	0.94				
	FIP4	0.79				
	Market performance (MP1)	0.89	0.92	0.93	0.82	
	MP2	0.94				
	MP3	0.89				
	MP4	0.91				

Table 3. Means, SD, and Correlations (n = 227)

Construct	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) IET	3.83	.80	0.81						
(2) DL	4.19	.74	.468**	0.90					
(3) SI	3.66	.88	.580**	.544**	0.89				
(4) DTS	3.68	.85	.601**	.557**	.696**	0.93			
(5) OI	3.97	.81	.605**	.596**	.661**	.621**	0.91		
(6) FIP	3.62	.88	.445**	.472**	.578**	.666**	.579**	0.91	
(7) MP	3.77	.84	.428**	.476**	.535**	.668**	.592**	.718**	0.90

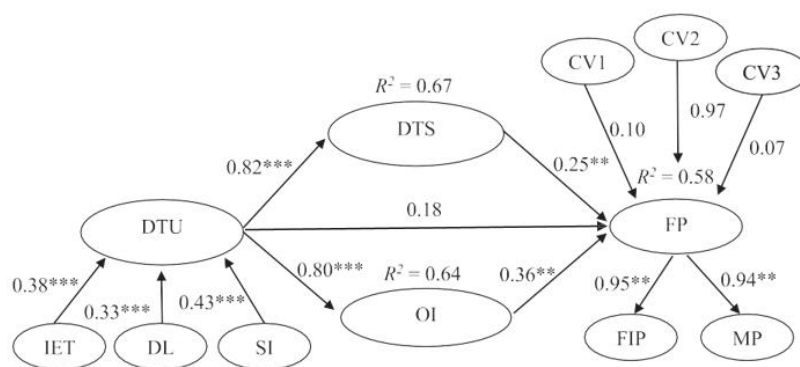


Figure 2. PLS results of the direct effects

Table 4. Direct Results of PLS Analysis

Hypothesised Relationships	Path Coefficients	T-value	Results
Direct effects			
DTU → DTS (H1)	0.82***	35.95	Supported
DTU → OI (H2)	0.80***	31.73	Supported
DTS → FP (H3)	0.30**	2.93	Supported
OI → FP (H4)	0.31**	3.21	Supported
DTU → FP (H5)	0.18	1.75	Un-supported
Indirect effects			
DTU → DTS → FP (H6)	0.23**	2.89	Supported
DTU → OI → FP (H7)	0.24***	3.35	Supported
R ²			
DTS	0.67		
OI	0.64		
FP	0.58		

4. Discussion

The findings of this study highlight how financial firms in Taiwan use digital technologies to convert market knowledge and information into actionable digital transformation strategies. Digital technologies are perceived not only as valuable IT resources but also as enablers of organizational innovation, allowing firms to establish new administrative and operational procedures. In this sense, technology adoption contributes positively to both digital transformation strategies and innovation practices, which in turn enhance firm performance. However, the direct effect of digital technology usage on firm performance was found to be insignificant. This may be explained by three factors. First, prior studies that confirmed a strong positive relationship (e.g., Gillani et al., 2020) were largely conducted in manufacturing contexts, where production system flexibility leads to improvements in design, delivery, and quality—advantages less directly relevant to financial service firms. Second, single regression analysis in this study showed a significant effect of digital technology usage on firm performance ($\beta = 0.66$, $t = 13.20$, $p < 0.001$), but this effect weakened once digital transformation strategy and organizational innovation

were introduced as mediators, indicating that these factors serve as the primary channels of influence. Third, Taiwanese financial service firms have already embedded technologies such as fintech across multiple functions, making technology usage a routine IT infrastructure for survival in a highly competitive market rather than a unique differentiating factor. Overall, the results suggest that the benefits of digital technologies are best realized when they are integrated into transformation strategies and innovation processes. By leveraging information exchange and transactions, distributed ledgers, and shared infrastructure, firms can strengthen transformation initiatives and innovation efforts that ultimately lead to improved financial and market outcomes.

This study makes several contributions to the literature. First, it refines the understanding of digital technology usage by framing it as a second-order hierarchical formative construct, encompassing information exchange, distributed ledgers, and shared infrastructure, thereby extending the work of Janssen et al. (2020). This conceptualization provides a more comprehensive view of digital technology adoption and its organizational implications (Nambisan et al., 2017; Leonardi, 2013; Warner & Wäger, 2019; Usai et al., 2021). Second, the study contributes to digital transformation research by applying the frameworks of Matt, Hess, and Benlian (2015) and Vial (2019), aligning with recent calls for multidimensional approaches (Hanelt et al., 2021; Verhoef et al., 2021; Wessel et al., 2021). Within this framework, digital technology usage is positioned as the contextual condition, organizational innovation and transformation strategy serve as mechanisms, and firm performance emerges as the outcome. Third, the study advances understanding of mediating effects by showing that transformation strategies and innovation jointly explain the relationship between digital technology usage and firm performance, filling a gap in prior research that tended to focus on single mediators such as supply chain platforms (Li, Dai, & Cui, 2020) or digital innovation (Khin & Ho, 2019).

From a managerial perspective, the findings suggest that managers should exploit digital technologies strategically by investing in flexible architectures, centralized data processing, secure ledgers, and robust infrastructures that support rapid transactions and effective information sharing. They must also ensure that digital transformation strategies are aligned with organizational goals, selecting from approaches such as new product strategies, value-added services, customization, or platform strategies depending on the firm's resources, data ownership, and market positioning (Jin, Ma, & Ye, 2020; Danuso, Giones, & Ribeiro da Silva, 2021). In addition, fostering organizational innovation through knowledge management, new product or service development, and process improvement is essential for sustaining competitiveness and performance (Wang & Chen, 2020). This requires continuous structural adjustments and commitment to change management. Together, these insights stress that digital transformation strategy and organizational innovation should not be treated separately but as interconnected agendas that translate digital technology usage into superior firm performance.

This study is not without limitations. It focuses only on three dimensions of digital technology usage, leaving other potential factors unexplored. Moreover, digital transformation and organizational innovation are long-term processes that demand both time and financial resources, meaning their effects may not be fully captured in a cross-sectional design. A longitudinal approach using big data could provide stronger evidence of causal relationships. The study is also limited to Taiwan's financial sector, which constrains the generalizability of results to other contexts and industries. Future research should therefore apply the model in different countries and sectors. Finally, the reliance on perceptual data from supervisors may limit the precision of managerial insights, suggesting that multi-source or multilevel data collection would strengthen future findings. Despite these limitations, the study demonstrates that digital transformation strategy and organizational innovation play critical mediating roles in linking technology adoption to performance, offering valuable theoretical and practical contributions.

5. Conclusions

This study concludes that while digital technology usage alone does not directly enhance firm performance, its value lies in enabling digital transformation strategies and organizational innovation that together drive financial and market success. For financial service firms in Taiwan, digital technologies have become fundamental to operations, but their real contribution to performance emerges through carefully designed transformation initiatives and innovative practices. By reconceptualizing digital technology usage and empirically validating the mediating roles of transformation strategy and innovation, the study enriches the literature and offers practical guidance for managers. Firms that aim to achieve sustainable performance should therefore view digital technology not merely as an operational tool but as a strategic resource that, when integrated with transformation and innovation agendas, becomes central to long-term competitiveness and growth.

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