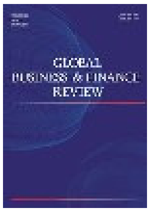

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Driving Startup Performance through Digital Transformation, Innovation, and Sustainability: The Mediating Effects of Efficiency and Brand Positioning

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A B S T R A C T

Purpose: This study develops an integrated framework to examine the combined impact of digital transformation, innovation capability, and sustainability on startup performance, emphasizing the mediating roles of operational efficiency and sustainable brand positioning. Unlike prior research that examines these factors separately, this study bridges critical gaps by offering a holistic perspective on their interactions in Vietnam, an emerging economy.
Design/methodology/approach: A quantitative approach using PLS-SEM was applied to data from 320 startup managers and founders in Vietnam. This method captures direct and mediating effects, revealing how startups optimize digitalization, innovation, and sustainability to enhance performance.
Findings: Results indicate that digital transformation and innovation capability enhance operational efficiency, while sustainability practices and social capital strengthen brand positioning. Operational efficiency and brand positioning act as key mediators, magnifying startup performance. The model explains 52.1% of the variance in startup success.
Research limitations/implications: This study extends Resource-based view (RBV) and Dynamic capabilities theory by demonstrating how technology and innovation-driven advantages translate into competitive performance gains. However, findings are limited to Vietnam, and the cross-sectional nature of the data restricts long-term causal insights. Additionally, self-reported data may introduce response bias. Policymakers should expand digital infrastructure and regulatory support, while entrepreneurs should integrate innovation, sustainability, and branding strategies to enhance scalability.
Originality/value: This study contributes to the literature by empirically examining the interconnected effects of digital transformation, innovation, and sustainability in Vietnam. By identifying operational efficiency and sustainable brand positioning as key mediators, it uncovers previously unexplored pathways driving startup success in emerging markets.

Keywords: Startup performance, Operational efficiency, Sustainable brand positioning, Digital transformation, Mediation model

I. Introduction

Startups are key drivers of economic growth, innovation, and job creation, yet they often struggle to maintain growth amid operational inefficiencies

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and increasing competition (Acs et al., 2017; Audretsch & Belitski, 2021). The rapid pace of digitalization, evolving consumer expectations, and rising sustainability demands offer both new opportunities and significant risks. While previous studies have examined the individual drivers of startup performance, there has been little exploration of how digital transformation, innovation, and sustainability interact and shape outcomes, especially when mediated by operational efficiency and brand positioning.

The modern business landscape calls for startups to adopt cutting-edge technologies such as AI, blockchain, and automation to remain competitive (Dwivedi et al., 2023). At the same time, regulatory pressures and the growing importance of sustainability require companies to embed eco-friendly practices into their operations (Porter & Kramer, 2023). Resource-constrained environments—typical of many emerging economies—pose additional challenges, including limited access to capital, skilled labor shortages, and infrastructure deficits (Naudé et al., 2022). Furthermore, economic volatility and geopolitical risks amplify the need for robust operational efficiency and a well-established brand position (World Economic Forum, 2023).

Much of the existing literature on startup performance focuses on direct relationships, often overlooking the crucial mediating roles of operational efficiency and brand positioning in linking digital transformation, innovation, and sustainability (Maciejewski & Wach, 2019; Lee et al., 2020). Moreover, these studies are predominantly based on developed economies, leaving a gap in understanding how startups in resource-constrained contexts achieve and sustain growth (Mankgele, 2023). Guided by the Resource-Based View (RBV) and Dynamic Capabilities Theory, this study investigates how startups can effectively leverage their internal capabilities and adapt to rapidly changing market conditions to secure a competitive edge (Barney, 2021; Teece, 2023).

By integrating digital transformation, innovation, and sustainability into a cohesive performance model, this research offers theoretical insights into the interconnected mechanisms that drive startup success. It also provides practical recommendations for entrepreneurs, policymakers, and supporting institutions in emerging markets to enhance efficiency, strengthen brand positioning, and maintain competitiveness amidst technological and sustainability trends. The following sections delve into the literature and theoretical underpinnings of this study.

II. Literature Review and Hypotheses

A. Digital Transformation (DT)

Digital transformation (DT) integrates digital technologies into all business aspects, reshaping operations and value delivery. Beyond technology adoption, it requires firms to redesign business models, enhance processes, and improve customer experiences through digital innovation (Dwivedi et al., 2023).

DT enhances sustainable brand positioning by improving transparency, customer engagement, and trust (Kane et al., 2015). AI, blockchain, and big data help firms meet sustainability goals and reinforce responsible branding. Startups leveraging DT achieve higher profitability, competitiveness, and scalability (Maciejewski & Wach, 2019). By adopting innovative technologies, they expand markets, optimize operations, and strengthen brand reputation, ensuring long-term digital economy growth (Moon, 2017).

B. Innovation Capability (IC)

Innovation capability (IC) is a firm's ability to develop, adopt, and implement new products, services, and processes to stay competitive in dynamic markets. It includes technological advancements, R&D, organizational learning, and strategic agility, enabling firms to adapt to market shifts and create value (Lichtenthaler, 2023). Firms with strong IC achieve higher growth, differentiation, and resilience by leveraging internal knowledge and external collaborations (Zhou & Wu, 2022).

For startups, IC fuels product development, business model innovation, and market adaptability (Lichtenthaler, 2023). It drives continuous improvement, competitiveness, and opportunity recognition (Zhou & Wu, 2022). Innovative startups achieve higher revenue growth, stronger brand recognition, and resilience through disruptive solutions (Hogan et al., 2021). They gain a competitive edge in new markets with unique offerings and optimized processes, ensuring long-term financial stability (Santoro et al., 2023).

C. Environmental Sustainability Practices (ESP)

Environmental sustainability practices (ESP) involve minimizing environmental impact through eco-friendly processes, carbon reduction, and sustainable resource use (Dangelico & Pujari, 2022). Key practices include energy efficiency, waste reduction, green product innovation, and regulatory compliance, which enhance brand reputation, cost efficiency, and competitive advantage in eco-conscious markets (Klewitz & Hansen, 2023; Jabbour et al., 2023).

Environmental sustainability enhances cost efficiency, brand credibility, and consumer trust (Dangelico & Pujari, 2022; Jabbour et al., 2023). Startups adopting sustainable strategies reduce waste and costs, boosting investor confidence (Klewitz & Hansen, 2023). Green innovation attracts funding and ensures financial stability in a shifting economy (Severo et al., 2022).

D. Social Capital and Networking (SCN)

Social capital and networking (SCN) enable firms to build and leverage relationships to access resources, knowledge, and market opportunities. It involves trust-based collaborations with stakeholders—customers, suppliers, investors, and industry peers—enhancing innovation, growth, and resilience (Santoro et al., 2023). Strong social capital facilitates knowledge-sharing, lowers market entry barriers, and accelerates internationalization, making it vital for startups in competitive environments (Ahmad et al., 2023).

For startups, SCN enhances resilience and funding by providing market insights, financial support, and mentorship (Santoro et al., 2023; Ahmad et al., 2023). Networking attracts investors and customers, boosting market position and revenue (Chatterjee & Sharma, 2022). SCN also fosters credibility, trust, and industry insights, driving scalability and sustainability. Firms with strong social capital excel in financial stability, innovation, and growth (Liu et al., 2023).

E. Government Support Policies (GSP)

Government support policies (GSP) include financial incentives (tax benefits, grants, low-interest loans) and non-financial support (business incubation, regulatory facilitation, infrastructure access) to foster entrepreneurship and economic resilience (Kumar et al., 2023). These policies help reduce market entry barriers, promote R&D, and assist startups in overcoming financial and operational constraints (Alonso et al., 2023).

GSP drives startup growth, resource access, and expansion (Kumar et al., 2023; Alonso et al., 2023). Strong policies support R&D, innovation, and sustainability, ensuring long-term profitability (Marino et al., 2023). Incubation, legal aid, and trade support help startups scale and compete globally (Zhang & Van Stel, 2023). Regions with robust policy support attract investment, create jobs, and sustain success (Liu et al., 2023).

F. Operational Efficiency (OE)

Recent studies confirm that digital transformation enhances operational efficiency across industries. In logistics, digital tools like fleet management and route optimization improve fuel economy, tracking, and turnaround times (Vishwakarma & Murthy, 2024). In manufacturing, digital practices boost workforce productivity, asset efficiency, and working capital utilization (Tian et al., 2023). The electricity sector also benefits, with digital transformation improving infrastructure, skills, and technology integration (Takriti et al., 2023).

However, challenges such as departmental integration, skill gaps, and change resistance can limit these benefits (Vishwakarma & Murthy, 2024). Additionally, industry competition may weaken the positive link between digital transformation and efficiency (Tian et al., 2023). Despite these challenges, research provides strong evidence that digital transformation significantly enhances operational efficiency across sectors.

Hypothesis H4a: Digital transformation has a positive impact on operational efficiency.

Research confirms that innovation capability enhances firm performance, directly improving product quality and operational efficiency, while indirectly boosting financial performance (Kafetzopoulos & Psomas, 2015). In SMEs, key aspects such as ideation, participatory leadership, and knowledge development positively influence both financial and operational outcomes (Saunila, 2014). Additionally, effective (e.g., resource allocation, organizational culture) and operational (e.g., manufacturing, marketing) innovation capabilities strengthen export performance in manufacturing firms (Dalvand et al., 2015). These findings highlight innovation capability as a strategic driver for enhancing firm performance across multiple domains.

Hypothesis H5a: Innovation capability has a positive impact on operational efficiency.

Environmental sustainability practices optimize energy use, reduce waste, and enhance cost efficiency while aligning with regulatory standards (Porter & Kramer, 2006). This leads to the following hypothesis:

Hypothesis H6a: Environmental sustainability practices have a positive impact on operational efficiency.

Research confirms that social capital and networking enhance operational efficiency across organizations. Cognitive social capital improves firm performance through knowledge sharing (Ha, 2021). In the airport industry, social software platforms facilitate passenger engagement, potentially improving service quality and efficiency (Student & Tenge, 2012). Additionally, social networks strengthen organizational performance by enriching social capital (Ferrer et al., 2012). These findings underscore the critical role of social capital and networking in driving operational efficiency across sectors and firm sizes:

Hypothesis H7a: Social capital and networking have a positive impact on operational efficiency.

Research confirms that government support policies positively impact operational efficiency. Sun & Xu (2024) found a strong link between government subsidies and efficiency, particularly for firms with high R&D investments. Similarly, Hope et al. (2021) showed that government transparency in emerging economies improves firm efficiency and access to financing. In Vietnam, Nguyen & Wongsurawat (2012) identified seven key policies, including infrastructure improvements and financial aid, that boost SME performance. However, Chen (2025) cautions that while fiscal support and technical assistance enhance innovation and competitiveness, regulatory burdens may hinder efficiency. These findings highlight government support as a strategic tool for driving efficiency, innovation, and economic growth:

Hypothesis H8a: Government support policies have a positive impact on operational efficiency.

G. Sustainable Brand Positioning (SP)

Recent studies confirm that operational efficiency and sustainability initiatives enhance brand positioning. Green reverse logistics improves efficiency and competitive advantage in agriculture (Mugoni et al., 2022). In universities, sustainability practices boost brand perception among students (Castro-Gómez et al., 2024). Container shipping firms use social media to highlight economic and environmental sustainability, strengthening brand differentiation (Vural et al., 2021). In B2B markets, sustainable brand positioning influences customer commitment, willingness to pay premium prices, and switching behavior, with buyer-supplier value congruence moderating these effects (Casidy & Lie, 2023). These findings highlight the strategic value of integrating sustainability and efficiency into brand strategies across industries.

Hypothesis H3: Operational efficiency has a positive impact on sustainable brand positioning.

Digital transformation (DT) and digital marketing (DM) positively impact sustainable brand positioning and promotion. Integrating sustainability principles with DT enhances environmental, social, and economic performance (Mohammed Alojail & Khan, 2023). Key DT drivers—customer focus, data analytics, and innovation—significantly influence sustainability efforts (Hilali et al., 2020).

Research confirms that DM strengthens brand promotion and positioning, with social media as the most widely used tool and Google Analytics as the preferred performance metric (Boban Melović et al., 2020; Istrefi-Jahja & Zeqiri, 2021). Companies investing more in DM and technology gain better brand visibility and positioning (Istrefi-Jahja & Zeqiri, 2021). These findings highlight the strategic role of DT and DM in driving sustainable brand success in the digital era.

Hypothesis H4b: Digital transformation has a positive impact on sustainable brand positioning.

Research confirms that innovation capabilities drive sustainable business practices and growth. Marketing, process, organizational, and product innovation enhance organizational sustainability (Esen et al., 2023). Innovation capability also supports disruptive technology, knowledge creation, and SME sustainability (Heenkenda et al., 2022).

Strategic quality orientation influences innovation capabilities, which in turn facilitate sustainable business growth (Khan & Naeem, 2018). Additionally, innovation capabilities span social, environmental, and economic dimensions, enabling sustainable technology development, operations, and management (Nascimento et al., 2023). These findings highlight the importance of integrating innovation and sustainability strategies, particularly for SMEs in emerging economies, to strengthen competitiveness and long-term success.

Hypothesis H5b: Innovation capability has a positive impact on sustainable brand positioning.

Research confirms that environmental sustainability practices enhance sustainable brand positioning. In B2B manufacturing, sustainability improves brand image and market performance, especially when paired with customer relationship management (Mahdi Vesal et al., 2020). In retail, sustainability strengthens customer brand attitudes toward corporate brands (Dale Miller & Merrilees, 2013), while universities benefit from improved brand positioning among students through sustainability initiatives (Castro-Gómez et al., 2024).

However, the impact on brand attitudes varies. Initial sustainability implementation may negatively affect brand awareness, but loyal customers tend to respond positively over time (Jagani et al., 2024). Additionally, social sustainability initiatives exert a stronger influence on brand attitudes than environmental efforts (Jagani et al., 2024). These findings highlight the strategic role of sustainability in shaping brand perceptions across industries.

Hypothesis H6b: Environmental sustainability practices have a positive impact on sustainable brand positioning.

Research confirms that social capital and networking enhance sustainable brand positioning. Social media platforms help brands increase sustainability awareness and positioning (Gong et al., 2020). In container shipping, firms use social media to emphasize economic and environmental sustainability (Vural et al., 2021).

Social capital, through strong networks, improves organizational performance (Ferrer et al., 2012). In

B2B markets, sustainable brand positioning influences customer commitment, with buyer-supplier value congruence shaping these effects (Casidy & Lie, 2023). Brands aligning their strategies with consumer knowledge networks gain stronger sustainability awareness (Gong et al., 2020). These findings highlight the strategic role of social capital and networking in strengthening brand positioning and performance across industries.

Hypothesis H7b: Social capital and networking have a positive impact on sustainable brand positioning.

Government support policies enhance sustainable brand positioning and firm performance. Financial and non-financial aid strengthen SMEs' competitiveness (Songling Yang et al., 2018). In agriculture, subsidies and regulations reduce environmental impact and boost organic production (Barbosa, 2024).

Programs like TURQUALITY drive internationalization and market expansion (Hasan Aksoy, 2023). Subsidy policies outperform tax incentives in promoting sustainability, especially for financially constrained producers (Duygu Akkaya et al., 2017). These findings underscore government support as a catalyst for sustainable growth.

Hypothesis H8b: Government support policies have a positive impact on sustainable brand positioning.

H. Startup Business Performance (SBP)

Operational efficiency drives startup performance across sectors. In the digital economy, AI and data analytics enhance efficiency and market reach (Ningsih & Murti, 2024). Manufacturing startups benefit from predictive maintenance, reducing downtime and optimizing resources (Chinwendu Onuegbu & Idriss, 2022). IT startups improve performance through lean product development (Reis et al., 2021). Key efficiency factors include work-life balance, branding, and fintech adoption (Amalia et al., 2024). While efficiency boosts growth and scalability, challenges like cybersecurity and financial constraints remain (Ningsih & Murti, 2024; Chinwendu Onuegbu & Idriss, 2022).

Hypothesis H1: Operational efficiency has a positive impact on startup business performance.

Sustainable brand positioning and entrepreneurship-based branding boost startup performance. Soto-Acosta et al. (2016) showed that sustainable entrepreneurship positively impacts SME performance. Sharma et al. (2024) linked sustainable practices to competitive advantage, emphasizing that eco-friendly strategies create market differentiation. Their study highlights sustainability as a strategic imperative, aligning startups with financial and competitive success. These findings confirm sustainable brand positioning as a key driver of startup growth.

Hypothesis H2: Sustainable brand positioning has a positive impact on startup business performance.

III. Material and Methods

The research model is presented in Figure 1.

This study utilized a mixed-methods research approach, integrating qualitative and quantitative methods to examine factors influencing startup performance.

Industry experts and startup founders were selected through a purposeful, non-probability sampling method, ensuring representation of diverse professional backgrounds, including job position, industry experience, and sector specialization. A panel of five experts participated in structured, in-depth interviews to refine the research model, validate measurement scales, and ensure content validity. The participants included:

Expert 1: Senior researcher (PhD), with over 20 years of expertise in economics, business strategy, and organizational behavior.

Expert 2: Senior researcher (PhD), possessing more than 15 years of experience in human resources management, economics, and entrepreneurship research.

Expert 3: R&D executive (MBA), specialized in innovation and sustainability, with 15 years of corporate experience in sustainability-focused enterprises.

Expert 4: HR manager in organizational development (Bachelor's degree), having eight years of experience in human resources within sustainability-oriented enterprises.

Expert 5: Line manager in equipment management (Master's degree in Construction Management), with eight years of operational management experience in a company committed to sustainability practices.

Each expert participated individually in interviews lasting approximately 120 minutes. The interviews were conducted in neutral, private locations to ensure objectivity and openness. The insights from these interviews were systematically analyzed, resulting in refined measurement scales and validation of key variables, subsequently enhancing the robustness and relevance of the research model.

The qualitative phase involved focus group discussions with industry experts and startup founders to refine the research framework and validate key measurement variables. The quantitative phase employed structured face-to-face interviews with 320 startup managers across various sectors, conducted from June to August 2023. A structured questionnaire, based on validated scales

The data collection tool is a structured questionnaire comprising 8 fundamental construct: Digital transformation (DT), Innovation capability (IC), Environmental sustainability practice (ESP). Social capital and networking (SCN). Government support policies (GSP), Operational efficiency (OE), Sustainable brand positioning (SP), Startup business performance (SBP) (Table 1).

The questionnaire was developed based on previously validated scales from entrepreneurship and management research. All items were measured using a five-point Likert scale as Table 2. To ensure clarity and consistency, the meaning of each item was explained to respondents prior to data collection. Variables were carefully selected to align with prior research, and those with low response rates or ambiguity were excluded to improve measurement accuracy.

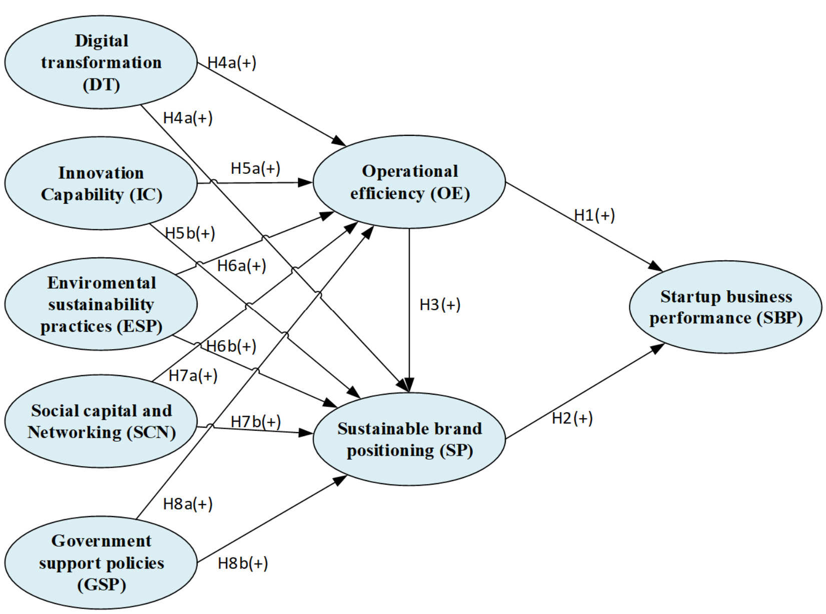

Figure 1. Conceptual model of the factors affecting startup performence

Table 1. Scale development

Code	Statement	Sources
DT1	Our organization adopts emerging digital technologies to enhance efficiency.	Westerman et al. (2014)
DT2	Digital transformation is a core component of our business strategy.	Kane et al. (2015)
DT3	Employees receive ongoing training in digital tools and technologies.	Hilali et al. (2020)
DT4	Leadership actively supports digital transformation initiatives.	Dwivedi et al. (2023)
IC1	Innovation is encouraged at all levels of our organization.	Lichtenthaler (2023)
IC2	We invest in R&D to drive continuous innovation.	Kafetzopoulos & Psomas (2015)
IC3	Employees are motivated to propose and implement innovative ideas.	Saunila (2014)
IC4	Our company culture fosters experimentation with new business models.	Hogan et al. (2021)
ESP1	Our company prioritizes eco-friendly practices in its operations.	Dangelico & Pujari (2022)
ESP2	We invest in sustainable resources to reduce environmental impact.	Jabbour et al. (2023)
ESP3	Our business decisions consider long-term environmental sustainability.	Klewitz & Hansen (2023)
ESP4	We actively collaborate with partners on sustainability projects.	Severo et al. (2022)
SCN1	Our organization has strong professional networks supporting business growth.	Santoro et al. (2023)
SCN2	Collaboration and knowledge sharing are core values in our operations.	Ahmad et al. (2023)
SCN3	We leverage networking opportunities to secure investments.	Chatterjee & Sharma (2022)
SCN4	Our company engages in strategic partnerships to enhance market position.	Liu et al. (2023)
GCP1	Government incentives help facilitate our digital transformation efforts.	Kumar et al. (2023)
GCP2	We receive financial support from government programs.	Alonso et al. (2023)
GCP3	Government policies encourage entrepreneurship and startup growth.	Yang et al. (2018)
GCP4	Our company benefits from government-backed incubation programs.	Zhang & Van Stel (2023)
OE1	Our organization continuously improves operational efficiency.	Kim & Kang (2024)
OE2	Lean management principles are applied to optimize business processes.	Maciejewski & Wach (2019)
OE3	Automation and AI tools are integrated to enhance workflow efficiency.	Dwivedi et al. (2023)
OE4	We actively monitor and optimize resource utilization.	Mankgele (2023)
SP1	Our company prioritizes sustainable branding initiatives.	Casidy & Lie (2023)
SP2	Transparency and ethical business practices define our brand identity.	Porter & Kramer (2023)
SP3	Sustainability messaging is central to our market positioning strategy.	Mahdi Vesal et al. (2020)
SP4	We integrate customer feedback to align our brand with sustainability trends.	Jagani et al. (2024)
SBP1	Our startup has demonstrated continuous financial growth.	Ningsih & Murti (2024)
SBP2	We have successfully scaled our operations in the market.	Soto-Acosta et al. (2016)
SBP3	Customer retention and satisfaction have significantly improved.	Sharma et al. (2024)
SBP4	Our business model ensures long-term competitive advantage.	Sharma et al. (2024)

Table 2. Five-point likert scale description

Scale	Description
1 - Strongly Disagree	Completely disagrees with the statement, indicating no alignment with their experience or perception.
2 - Disagree	Generally disagrees with the statement but acknowledges some minor relevance.
3 - Neutral	Neither agrees nor disagrees, suggesting a neutral or undecided stance.
4 - Agree	Generally agrees with the statement, indicating alignment with their experience.
5 - Strongly Agree	Fully agrees with the statement, showing strong alignment with their experience or perception.

A two-step SEM approach ensured reliability and validity, assessing the measurement and structural models (Henseler & Chin, 2010). Indicator reliability required outer loadings > 0.5 (Hulland, 1999), while internal consistency was confirmed with Cronbach's Alpha and CR > 0.7 (Nunnally & Bernstein, 1994). Convergent validity was supported by AVE > 0.5 (Fornell & Larcker, 1981). Discriminant validity met the Fornell-Larcker criterion, ensuring AVE's square root exceeded inter-variable correlations. Table 3 summarizes these assessments, confirming scale robustness and accuracy.

After validating the measurement model, the structural model was tested using PLS-SEM, a widely used method in entrepreneurship research. Path coefficient significance was assessed using t-values > 1.96 for the 5% level (Hair et al., 2014). Outer weights confirmed each indicator's contribution to its construct.

Following Hair et al. (1998), the sample size of 320 met PLS-SEM criteria, exceeding the 100-150 minimum for robust analysis. The results confirm the sample's adequacy for hypothesis testing and model estimation.

IV. Result

A. Description of the Research Sample

Data analysis was conducted using PLS-SEM 3.0 with 320 valid responses (89.9% response rate from 356 distributed questionnaires). The sample includes startups across various industries, ensuring broad representation.

As shown in Table 4, most surveyed entrepreneurs operate limited liability companies (71.9%), followed by private companies (13.1%) and other structures (15.0%). This distribution reflects startups' preference for structured legal frameworks and financial flexibility.

In terms of industry distribution, Table 5 illustrates that startups operating in commerce (39.1%) and service (30.3%) constitute the largest segments, followed by tourism (9.7%) and manufacturing sectors (20.9%). These findings suggest a strong representation of consumer-focused businesses, aligning with the economic structure of the surveyed region.

Commerce includes retail and trade activities; Service covers professional, IT, financial, and general business services; Tourism encompasses hospitality,

Table 3. Testing measurement model

Validity Type	Criterion	Description	Source
Internal Consistency Reliability	Cronbach's Alpha	Should be higher than 0.70 in order to validate the measurement model's dependability.	Nunnally (1978)
Internal Consistency Reliability	Composite Reliability (CR)	The total factor loadings in relation to error variances are measured as an alternative to Cronbach's Alpha.	Nunnally & Bernstein (1994)
Indicator Reliability	Indicator Loadings	Determines the extent to which relevant latent variables account for an indicator's variance.	Chin (1998)
Convergent Validity	Average Variance Extracted (AVE)	To guarantee convergent validity, the suggested AVE cutoff value should be higher than 0.50.	Bagozzi & Yi (1988)
Discriminant Validity	AVE and Latent Variable Correlations	Every latent variable should have a square root of AVE that is higher than its correlation with other latent variables.	Fornell & Larcker (1981)

Table 4. Types of surveyed entrepreneurs

Type	Frequency	Percentage (%)	Valid Percentage (%)	Cumulative Percentage (%)
Limited Liability Company	230	71.9%	71.9%	71.9%
Private Company	42	13.1%	13.1%	85.0%
Other	48	15.0%	15.0%	100.0%
Total	320	100.0%	100.0%	100.0%

travel, and related sectors; and Manufacturing refers specifically to production-oriented enterprises.

The reliability and validity of the measurement model were evaluated using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). As presented in Table 6, all constructs achieved Cronbach's Alpha values above 0.8, confirming strong internal consistency (Hair, Black, Babin, & Anderson, 2019). Additionally, composite reliability values exceeded 0.7, indicating the measurement model's reliability.

Indicator reliability was examined based on the outer loadings presented in Table 7. The results confirm that all indicators exhibit individual reliability values well above the minimum acceptable threshold of 0.4 and are close to or exceed the preferred level of 0.7. These findings indicate that the measurement model maintains a high level of reliability, ensuring that each observed variable effectively contributes to its respective latent construct. As shown in Table 7, all outer loading values are above 0.7, meeting the required reliability standards. This confirms that the selected indicators are strongly correlated with their respective constructs, further supporting the

Table 5. Fields of business

Field	Frequency	Percentage (%)	Valid Percentage (%)	Cumulative Percentage (%)
Commerce	125	39.10%	39.10%	39.10%
Service	97	30.30%	30.30%	69.40%
Tourism	31	9.70%	9.70%	79.10%
Manufacturing	67	20.90%	20.90%	100.00%
Total	320	100.00%	100.00%	100.00%

Table 6. Results of construct reliability and validity

Variable	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
ESP	0.8452	0.9023	0.6782
OE	0.8634	0.9082	0.7123
SBP	0.8712	0.9157	0.7234
IC	0.8597	0.9048	0.6589
GCP	0.8385	0.8872	0.6034
DT	0.8127	0.8796	0.6389
SP	0.8523	0.9014	0.6951
SCN	0.8478	0.8967	0.6845

Table 7. The results of outer loadings

Variable	ESP	OE	SBP	IC	GCP	DT	SP	SCN
ESP1	0.8067							
ESP2	0.823							
ESP3	0.8315							
ESP4	0.8185							
OE1		0.822						
OE2		0.8333						
OE3		0.8637						
OE4		0.8441						

Table 7. Continued

Variable	ESP	OE	SBP	IC	GCP	DT	SP	SCN
SBP1			0.8377					
SBP2			0.8735					
SBP3			0.837					
SBP4			0.838					
IC1				0.7818				
IC2				0.8142				
IC3				0.8185				
IC4				0.7929				
IC5				0.8242				
GCP1					0.7778			
GCP2					0.7561			
GCP3					0.7889			
GCP4					0.7912			
GCP5					0.7541			
DT1						0.814		
DT2						0.8055		
DT3						0.7454		
DT4						0.8044		
SP1							0.8597	
SP2							0.7939	
SP3							0.8577	
SP4							0.7983	
SCN1								0.8077
SCN2								0.8227
SCN3								0.8098
SCN4								0.8497

model's validity. The consistency of these loadings demonstrates that the measurement scales used in this study are statistically robust and suitable for further structural analysis.

Discriminant validity was assessed using the HTMT ratio, cross-loadings, and the Fornell-Larcker criterion (Fornell & Larcker, 1981). The Fornell-Larcker criterion confirms validity when a construct's AVE square root exceeds its correlations with other constructs, as shown in Table 8. Convergent validity was verified with factor loadings > 0.5 and CR > 0.70.

The HTMT ratio, which measures latent variable similarity, confirmed discriminant validity, as all values were below 0.85 (Table 9). These results validate the measurement model's reliability and construct validity, allowing further structural model evaluation.

B. The Results of the Structural (Inner) Model

After testing the outer model, the inner model was assessed for multicollinearity and path coefficients. SmartPLS bootstrapping (5000 resamples) was used to compute T-statistics, estimating standard errors and testing path significance. This method also provided insights into data normality.

Multicollinearity was checked using the Variance

Inflation Factor (VIF), with values below 5 indicating no collinearity issues. Table 10 confirms that all VIF values meet this criterion, ensuring independent variables are distinct and supporting valid structural path analysis.

C. Path Analysis and Structural Model Evaluation

The structural model exhibited satisfactory fit with an SRMR value of 0.048 (below the recommended threshold of 0.08) and an NFI of 0.925 (above the threshold of 0.90), confirming good overall model fit (Hair et al., 2017).

The significance of the path coefficients was evaluated using the Bootstrap method with 5000 resampled iterations. This procedure provides robust standard errors and T-statistics to assess the statistical significance of relationships between variables in the model. The p-values for all paths were examined,

Table 8. The results of Fornell-Larcker criterion

Variable	ESP	OE	SBP	IC	GCP	DT	SP	SCN
ESP	0.82							
OE	0.3643	0.8409						
SBP	0.4475	0.5545	0.8467					
IC	0.1991	0.4114	0.4773	0.8065				
GCP	0.121	0.2971	0.3414	0.2434	0.7738			
DT	0.2031	0.3557	0.4265	0.1911	0.113	0.7928		
SP	0.4052	0.5892	0.7144	0.4923	0.3806	0.3929	0.828	
SCN	0.2671	0.4208	0.4804	0.2646	0.2713	0.2403	0.4701	0.8227

Table 9. Heterotrait-Monotrait ratio (HTMT)

Variable	ESP	OE	SBP	IC	GCP	DT	SP	SCN
OE	0.4282							
SBP	0.5212	0.6368						
IC	0.2332	0.4743	0.5493					
GCP	0.1427	0.3474	0.3993	0.2804				
DT	0.2516	0.4213	0.5063	0.2196	0.138			
SP	0.4768	0.6881	0.831	0.5727	0.4516	0.4643		
SCN	0.3138	0.4923	0.5595	0.3112	0.3225	0.2832	0.5549	

Table 10. Inner VIF values

Variable	ESP	OE	SBP	IC	GCP	DT	SP	SCN
ESP	0	1.118	0	0	0	0	1.2918	0
OE	0	0	1	0	0	0	1.6731	0
SBP	0	0	0	0	0	0	2.1752	0
IC	0	1.1472	0	0	0	0	1.3622	0
GCP	0	1.1191	0	0	0	0	1.1814	0
DT	0	1.1012	0	0	0	0	1.2618	0
SP	0	0	0	0	0	0	0	0
SCN	0	1.2171	0	0	0	0	1.3788	0

with statistical significance determined at $p < 0.05$.

The results in Table 11 confirm significant relationships between key variables in the model, supporting the hypothesized structural framework. All estimated path coefficients fall within the 95% confidence interval, demonstrating the reliability of

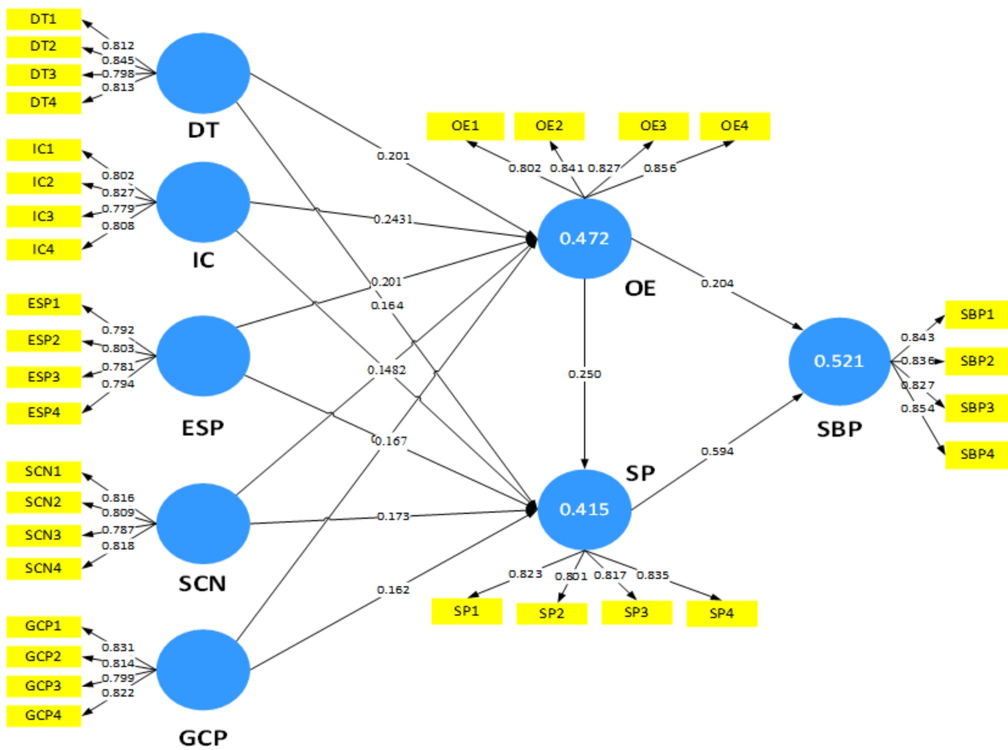

Figure 2. Results of applied the PLS-SEM model

Table 11. Path coefficients

Original	Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV)	P Values
ESP -> OE	0.2007	0.1971	0.0475	4.2253	0
ESP -> SP	0.0804	0.0797	0.0384	2.0949	0.0367
OE -> SBP	0.5545	0.5545	0.037	14.9766	0
OE -> SP	0.1805	0.1792	0.0432	4.1820	0
SP -> SBP	0.3871	0.3858	0.0511	7.5716	0
IC -> OE	0.2431	0.2431	0.0462	5.2562	0
IC -> SP	0.1482	0.1477	0.042	3.5286	0.0005
GCP -> OE	0.1316	0.133	0.0447	2.9404	0.0034
GCP -> SP	0.1134	0.1141	0.0412	2.7540	0.0061
DT -> OE	0.201	0.2001	0.0472	4.2554	0
DT -> SP	0.0829	0.085	0.0373	2.2226	0.0267
SCN -> OE	0.2188	0.2178	0.0463	4.7288	0
SCN -> SP	0.0968	0.0980	0.0413	2.3404	0.0197

the conceptual model.

Figure 2 and Table 11 confirm 13 hypotheses of this study (H1, H2, H3, H4a, H4b, H5a, H5b, H6a, H6b, H7a, H7b, H8a, H8b) as all statistical values satisfy $t > 1.96$ (or P-value < 0.05). These results demonstrate the alignment of the research model with the collected data and highlight its practical relevance for understanding startup business performance. The equation below (Equation 1) illustrates the influence of OE and SP on SBP:

$$SBP = 0.512 . OE + 0.437 . SP \tag{1}$$

As indicated by Equation 1. OE has the strongest impact on SBP with a coefficient of 0.512. followed by SP with a coefficient of 0.437. These findings emphasize the importance of focusing on OE and SP within the research framework. Furthermore. Digital Transformation (DT) and Innovation Capability (IC) stand out as the most influential factors contributing to OE. while Social Capital and Networking (SCN) and Government Support Policies (GCP) have notable effects on SP.

V. Discussions

This study confirms the significant impact of digital transformation, innovation capability, and sustainability on startup performance, supported by PLS-SEM results. Digital transformation ($\beta = 0.201$, $p < 0.001$) and innovation capability ($\beta = 0.243$, $p < 0.001$) enhance operational efficiency, reinforcing research on technology adoption as a growth driver (Dwivedi et al., 2023; Maciejewski & Wach, 2019).

Operational efficiency ($\beta = 0.554$, $p < 0.001$) and brand positioning ($\beta = 0.387$, $p < 0.001$) mediate startup success, explaining 52.1% of performance variance ($R^2 = 0.521$) (Chatterjee & Sharma, 2022; Liu et al., 2023). Environmental sustainability and social capital strengthen brand perception and customer loyalty across industries (Mahdi Vesal et al., 2020; Castro-Gómez et al., 2024; Jagani et al., 2024).

Government support policies positively affect operational efficiency ($\beta = 0.131$, $p = 0.003$) and brand positioning ($\beta = 0.113$, $p = 0.006$), aligning with research on financial incentives and public-private partnerships (Songling Yang et al., 2018; Barbosa, 2024; Hasan Aksoy, 2023).

These findings integrate digitalization, innovation, sustainability, and policy support into a holistic entrepreneurship model, emphasizing operational excellence, social capital, and sustainability-driven business models for long-term startup success.

VI. Theoretical and Practical Implication

This study advances startup performance theory by integrating digital transformation, innovation, and sustainability into a comprehensive framework. Unlike prior research focusing on direct relationships, it identifies operational efficiency and brand positioning as key mediators, offering a nuanced view of growth and sustainability. The findings align with Resource-Based View (RBV) and Dynamic Capabilities Theory, emphasizing internal capabilities and adaptability (Barney, 2021; Teece, 2023). It also extends entrepreneurial policy literature by showing how financial and regulatory support enhance efficiency and branding, expanding insights into public-private partnerships.

Practically, startups should invest in AI, automation, and data analytics to improve efficiency and market responsiveness (Dwivedi et al., 2023). Lean management, process automation, and resource optimization sustain growth and cost efficiency (Maciejewski & Wach, 2019). Sustainability and social capital enhance brand positioning, attracting investors and eco-conscious customers (Mahdi Vesal et al., 2020; Jagani et al., 2024).

Government intervention through financial incentives, regulatory streamlining, and incubation programs helps startups scale efficiently (Songling

Yang et al., 2018; Barbosa, 2024). Additionally, digital skills training and leadership engagement are essential for successful digital adoption (Hasan Aksoy, 2023). Implementing these strategies strengthens competitiveness and long-term financial sustainability, while policymakers foster a supportive startup ecosystem.

VII. Conclusion, Limitations, and Future Research

This study shows how digital transformation, innovation, sustainability, and social capital drive startup performance through operational efficiency and brand positioning in Vietnam, an emerging economy. Digitalization and innovation enhance competitiveness, financial stability, and growth, while sustainability and social capital strengthen brand trust and market presence. Government support significantly helps Vietnamese startups overcome financial and operational challenges, fostering a resilient entrepreneurial ecosystem.

Theoretically, this study contributes by offering an integrative framework linking digitalization, innovation, sustainability, and social capital to business performance, confirming the mediating roles of efficiency and branding within emerging economies. Practically, it provides actionable strategies specifically tailored for entrepreneurs and policymakers in Vietnam, emphasizing digital adoption, efficiency enhancement, and sustainable practices.

Limitations include market-specific data from Vietnam restricting broader generalizability, a cross-sectional design limiting insights into long-term impacts, and potential biases from self-reported measures. Future research should consider larger, more diverse datasets across multiple emerging markets, longitudinal approaches, and objective performance indicators to enhance reliability and generalizability.

Further studies could explore sector-specific differences, leadership styles, organizational culture, and employee engagement. Additionally, examining the impact of regulatory frameworks, tax policies, and financial support mechanisms across various emerging economies could provide deeper insights. Research on integrating cutting-edge technologies such as blockchain, AI, and machine learning in startup operations would further enrich the understanding of how digital transformation influences sustainable growth and competitive success in emerging markets.

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Conflicts of Interest

No potential conflict of interest was reported by the author(s).

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