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Digital Entrepreneurial Ventures in Southeast Asia: Assessing Institutional and Capability-Based Drivers of Performance

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Abstract

The proliferation of digital technologies has fundamentally reconfigured the entrepreneurial landscape across Southeast Asia, enabling platform-driven ventures to achieve rapid scalability while simultaneously exposing nascent digital startups to heightened competitive turbulence and institutional uncertainty. Grounded in Dynamic Capability Theory (DCT), this study investigates the relationship between digital entrepreneurship orientation (DEO) and startup performance (SP), examining dynamic capabilities (DC) as a mediating mechanism and institutional environment quality (IEQ) as a contextual moderator. Employing a panel data design across 412 technology startups operating in Vietnam, Malaysia, and Thailand over a three-year period (2021–2023), the study applies a two-step system Generalized Method of Moments (GMM) estimator to address endogeneity concerns inherent in startup performance research. Findings reveal that DEO exerts a significant positive effect on startup performance ($\beta = 0.387$, $p < .001$), with dynamic capabilities fully mediating this relationship (indirect effect = 0.241, 95% CI [0.178, 0.312]) when institutional environment quality is held at mean levels. The moderated mediation analysis further establishes that the mediating role of dynamic capabilities in the DEO–SP relationship is significantly stronger under high-quality institutional environments (index difference = 0.143, $p < .01$), suggesting that institutional scaffolding amplifies startups' capacity to convert digital orientations into performance-relevant capability configurations. These findings extend DCT to the digital entrepreneurship domain, providing novel evidence that digital orientation, dynamic capabilities, and institutional context interact in theoretically predictable and practically consequential ways across heterogeneous Southeast Asian emerging markets.

Keywords: digital entrepreneurship, startup performance, dynamic capabilities, institutional environment, panel data, Southeast Asia, GMM estimation

1. Introduction

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The digitalization of economic activity represents one of the most consequential structural transformations of the contemporary global economy, and nowhere is its entrepreneurial impact more visible than across the diverse, rapidly growing economies of Southeast Asia. The ASEAN digital economy, valued at approximately USD 218 billion in 2023 and projected to reach USD 600 billion by 2030, has generated an unprecedented wave of technology startup formation—from platform-based e-commerce ventures and fintech disruptors to agritech innovators and digital health providers (Google, Temasek, & Bain, 2023). Vietnam, Malaysia, and Thailand—the three focal economies of the present study—collectively accounted for over 47% of new ASEAN technology startup registrations in 2022, underscoring their combined significance as an empirical arena for investigating digital entrepreneurship dynamics (ASEAN Secretariat, 2023).

Yet despite this proliferation of digital startup activity, the performance outcomes of digital entrepreneurship remain empirically contested. High failure rates persist across the region—approximately 72% of Southeast Asian technology startups fail to achieve profitability within their first three years of operation (Startup Genome, 2023)—suggesting that digital orientation alone is insufficient to generate sustained competitive performance. This performance heterogeneity raises a fundamental theoretical question that has received insufficient rigorous empirical investigation: through what organizational mechanisms does digital entrepreneurship orientation translate into startup performance, and under what institutional conditions are these mechanisms most effectively activated?

Dynamic Capability Theory (DCT), originating in Teece et al.'s (1997) foundational contribution and subsequently elaborated by Eisenhardt and Martin (2000), Teece (2007), and Zahra et al. (2006), provides a compelling theoretical scaffold for addressing this question. DCT posits that in rapidly changing environments—precisely the conditions that characterize digital marketplaces—competitive advantage derives not from the possession of static resource bundles but from an organization's capacity to sense environmental opportunities and threats, seize commercially promising opportunities through resource reconfiguration, and transform existing organizational routines and asset bases in response to competitive evolution. These three dynamic capability dimensions—sensing, seizing, and reconfiguring—represent the organizational microfoundations through which strategic orientation translates into performance outcomes (Teece, 2007, 2018).

The application of DCT to digital entrepreneurship contexts introduces both theoretical opportunities and analytical complications. On the opportunity side, digital technologies fundamentally alter the sensing, seizing, and reconfiguring processes available to ventures, enabling real-time market intelligence gathering, frictionless resource orchestration through digital platforms, and modular capability reconfiguration through API ecosystems (Nambisan, 2017; Nambisan et al., 2019). On the complication side, the institutional heterogeneity characteristic of Southeast Asian emerging markets—spanning differences in regulatory quality, intellectual property protection, digital infrastructure, and financial market development—creates contextual variation in the organizational

conditions under which dynamic capabilities can be effectively developed and deployed (Bruton et al., 2010; Peng et al., 2009).

This institutional dimension represents a critical but underexplored boundary condition in DCT-based entrepreneurship research. Institutional theory (North, 1990; Scott, 1995) posits that formal institutional arrangements—including regulatory frameworks, property rights systems, contract enforcement mechanisms, and access to financial infrastructure—shape the behavioral repertoire available to entrepreneurial actors and condition the returns to organizational capability investment. In high-quality institutional environments, dynamic capabilities are likely to generate stronger performance returns because ventures can more effectively appropriate the value created through sensing, seizing, and reconfiguring activities without the friction costs imposed by regulatory uncertainty, contract enforcement deficits, or financial market underdevelopment. In low-quality institutional environments, conversely, transaction costs may substantially erode the performance benefits of dynamic capability investment (Hoskisson et al., 2013; Webb et al., 2020).

Despite the theoretical relevance of this institutional moderation argument, empirical studies integrating DCT and institutional theory in the context of digital entrepreneurship remain scarce, particularly those employing longitudinal designs capable of distinguishing performance effects from selection and reverse causality artifacts. This study directly addresses this gap by employing a three-year panel dataset of 412 technology startups across three ASEAN economies, using system GMM estimation to provide identification-robust estimates of the DEO–DC–SP relationship under varying institutional quality conditions.

The study makes four primary contributions. First, it provides one of the first longitudinal, multi-country empirical tests of DCT in a digital entrepreneurship context across Southeast Asian emerging markets. Second, it formally theorizes and empirically validates dynamic capabilities as a mediating mechanism in the DEO–SP relationship, moving beyond prior research that has treated dynamic capabilities as direct performance antecedents. Third, it establishes institutional environment quality as a theoretically grounded and empirically significant moderator of the DC-mediated pathway, integrating institutional theory with DCT in a moderated mediation framework. Fourth, it employs system GMM estimation—a methodologically rigorous approach that addresses the endogeneity concerns that frequently undermine causal inference in startup performance research but that has been rarely applied in the digital entrepreneurship literature.

2. Literature Review

2.1 Digital Entrepreneurship: Conceptual Boundaries and Theoretical Context

Digital entrepreneurship, as a distinct scholarly domain, emerged from the broader entrepreneurship literature's engagement with information and communication technology (ICT) as both an environmental context and an organizational capability (Hull et al., 2007; Nambisan, 2017). Defined

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by Nambisan (2017, p. 1032) as "entrepreneurship that is enabled by, or is in, the digital context," digital entrepreneurship encompasses both new venture creation in digital industries and the digitally-enabled transformation of entrepreneurial processes across industry sectors. This dual framing is theoretically significant because it positions digital technologies not merely as sector-defining features but as general-purpose entrepreneurial enablers with cross-industry applicability.

Davidson and Vaast (2010) provided an early conceptualization of digital entrepreneurship opportunity recognition, emphasizing how digital technologies transform the temporal and spatial dimensions of opportunity identification by enabling near-instantaneous information acquisition and global market access. More recent scholarship by Nambisan et al. (2019) and Sussan and Acs (2017) has elaborated the systemic dimensions of digital entrepreneurship, conceptualizing digital ecosystems as emergent, multi-actor environments in which entrepreneurial opportunities are co-created through platform interactions, data exchanges, and API-enabled integrations.

Digital entrepreneurship orientation (DEO), the central independent variable of this study, draws on both the digital entrepreneurship literature and the established entrepreneurial orientation (EO) construct developed by Miller (1983) and Lumpkin and Dess (1996). DEO is conceptualized here as the degree to which a startup's strategic posture is characterized by digital technology integration, data-driven decision-making, platform-centric business model design, and digital innovation proactivity (Kraus et al., 2019; Zaheer et al., 2019). This multi-dimensional conceptualization captures the distinctive strategic logics that differentiate digitally oriented startups from their conventionally oriented counterparts.

2.2 Dynamic Capability Theory: Foundations and Digital Extensions

Teece et al.'s (1997) Dynamic Capability Theory represented a significant theoretical advance over the static resource-based view (Barney, 1991) by shifting analytical focus from resource possession to resource orchestration processes in dynamic competitive environments. Teece (2007) subsequently elaborated the DCT framework around three higher-order capability clusters: sensing capabilities (scanning, searching, and interpreting signals from technology, market, and regulatory environments); seizing capabilities (mobilizing resources to address opportunities and capture value); and reconfiguring capabilities (continuous renewal of tangible and intangible asset bases to avoid path dependency and maintain evolutionary fitness).

The application of DCT to entrepreneurial ventures—as opposed to established firms, which constituted the original empirical domain—introduces theoretical complications acknowledged by Zahra et al. (2006) and Helfat and Winter (2011). Nascent ventures lack the established routines and resource stocks from which dynamic capabilities are typically theorized to emerge, suggesting that dynamic capability development in entrepreneurial contexts may follow developmental pathways distinct from those observed in mature organizations. Eisenhardt and Martin (2000) addressed this partially by arguing

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that dynamic capabilities in high-velocity markets converge toward simpler, more experiential, and less codified forms—an observation particularly relevant to digital startup environments characterized by rapid competitive clock speeds.

Recent digital extensions of DCT by Teece (2018), Nambisan et al. (2019), and Ciampi et al. (2021) have argued that digital technologies fundamentally augment sensing capabilities through real-time analytics and AI-enabled market intelligence; amplify seizing capabilities through digital platform access and cloud-based resource scaling; and accelerate reconfiguring capabilities through modular digital architecture and agile organizational design. These digital augmentation effects provide theoretical justification for expecting that digital entrepreneurship orientation moderates the development and deployment of dynamic capabilities in startup contexts.

2.3 Startup Performance: Conceptualization and Measurement

Startup performance is a multi-dimensional construct that has been operationalized heterogeneously across the entrepreneurship literature, reflecting both the diverse stakeholder objectives associated with new venture creation and the practical measurement challenges posed by data availability constraints (Lumpkin & Dess, 1996; Murphy et al., 1996). Revenue growth, customer acquisition rate, market share expansion, innovation output, employee growth, and investor return metrics have all been employed as performance indicators in prior research, with choice of metric substantially affecting the direction and magnitude of antecedent relationships.

Following Freel and Robson (2004) and more recently Ciampi et al. (2021), the present study adopts a balanced performance operationalization incorporating financial performance (revenue growth rate and gross margin trajectory) and strategic performance (market position improvement and innovation output). This multi-dimensional approach mitigates single-metric bias while capturing the heterogeneous performance logics of early-stage startups for whom non-financial strategic metrics may be more informative than near-term financial outcomes (Davila et al., 2003).

2.4 Dynamic Capabilities as Mediators of the DEO–Performance Relationship

The theoretical argument for dynamic capabilities as mediators—rather than direct antecedents—of the DEO–performance relationship rests on the resource orchestration perspective (Sirmon et al., 2011), which posits that strategic orientations generate performance outcomes by shaping the processes through which organizations acquire, bundle, and deploy resources. Applied to the digital entrepreneurship context, DEO activates dynamic capability development by orienting organizational attention, resource allocation priorities, and learning investments toward the sensing, seizing, and reconfiguring activities through which digital opportunities are identified and exploited.

Empirical support for this mediation argument is nascent. Ciampi et al. (2021) found partial mediation of dynamic capabilities in the relationship between

digital transformation and SME performance in Italian manufacturing firms. Zaheer et al. (2019) demonstrated that digital orientation predicted dynamic capability development in technology startups, though their cross-sectional design precluded mediation testing. Kraus et al. (2019) provided conceptual arguments for the mediating role of digital capabilities without empirical validation. The present study provides a first rigorous longitudinal test of this mediation pathway.

2.5 Institutional Environment as a Moderating Boundary Condition

Institutional theory's relevance to entrepreneurship performance research has been convincingly established through the seminal contributions of North (1990), Scott (1995), and Peng et al. (2009). North's (1990) distinction between formal institutions (laws, regulations, property rights) and informal institutions (norms, traditions, cultural values) provides a foundational framework for understanding how the institutional environment shapes the transaction costs and strategic options available to entrepreneurial actors. In emerging market contexts, institutional quality variation—both across countries and over time within countries—creates a natural quasi-experimental setting for investigating institutional boundary conditions.

For digital entrepreneurship specifically, institutional environment quality affects performance outcomes through multiple channels. Regulatory quality determines the speed and predictability of market entry processes, platform regulatory frameworks, and data governance regimes—all of which directly affect digital startup operational costs and strategic flexibility (Autio et al., 2018). Intellectual property protection shapes the appropriability of digital innovations, with stronger IP regimes enabling startups to capture greater returns from digital capability investment (Teece, 2018). Access to financial infrastructure affects the availability of venture capital and growth financing needed to scale digital platform businesses. Collectively, these institutional dimensions create a contextual scaffolding that amplifies or constrains the performance returns to dynamic capability investment, motivating their formal incorporation as a moderating boundary condition.

2.6 Southeast Asian Digital Startup Ecosystems: Comparative Context

Vietnam, Malaysia, and Thailand represent three distinct but comparably dynamic digital startup ecosystems within the ASEAN region, providing theoretically valuable institutional heterogeneity for cross-country analysis. Vietnam's startup ecosystem, centered in Ho Chi Minh City and Hanoi, has grown rapidly on the strength of a young, digitally literate population, competitive manufacturing cost structures, and proactive government digital transformation policies including the National Digital Transformation Program (Ministry of Information and Communications, 2020). Malaysia's startup ecosystem benefits from more mature institutional infrastructure—stronger rule of law, better-developed capital markets, and more sophisticated regulatory frameworks—positioning it as a regional hub for higher-value digital services and fintech innovation (MaGIC, 2022). Thailand's ecosystem, centered in Bangkok, combines large domestic market scale with growing

regional connectivity, though institutional quality challenges—particularly regulatory predictability and IP enforcement—create headwinds for technology-intensive ventures (OECD, 2023).

This three-country comparative context provides sufficient institutional variance to identify moderation effects while maintaining sufficient industry and development-stage homogeneity to support valid cross-country comparisons—an important methodological advantage over studies that combine highly heterogeneous country samples without controlling for development-stage confounds.

2.7 Prior Empirical Research on Digital Entrepreneurship and Performance

The empirical literature on digital entrepreneurship and performance, while growing rapidly, remains characterized by several methodological limitations that reduce confidence in existing findings. Cross-sectional designs dominate the field (Nambisan, 2017; Kraus et al., 2019), making it difficult to distinguish performance effects from selection effects—the possibility that high-performance startups are simply more likely to adopt digital orientations rather than digital orientations causing performance improvements. Single-country studies limit generalizability and prevent institutional moderation testing. Self-reported performance measures introduce common method bias concerns. And the absence of rigorous endogeneity controls—despite the obvious reverse causality risk in orientation–performance relationships—undermines causal identification.

The present study directly addresses all four methodological concerns through its panel data design (addressing selection effects), multi-country sampling (enabling institutional moderation tests), balanced objective and subjective performance measurement, and system GMM estimation (providing endogeneity-robust identification).

3. Research Gap

Despite the growing scholarly attention to digital entrepreneurship and the theoretical richness of Dynamic Capability Theory, three critical gaps persist. First, the mediating mechanism through which digital entrepreneurship orientation generates startup performance has not been rigorously tested in a longitudinal, endogeneity-controlled empirical design—particularly within the Southeast Asian emerging market context. Second, institutional environment quality has been conceptually invoked but rarely formally modeled as a moderator of the DC-mediated DEO–performance pathway, leaving the boundary conditions of DCT in digital entrepreneurship contexts empirically underdetermined. Third, prior multi-country studies of Southeast Asian digital entrepreneurship have largely employed cross-sectional, variance-based methods that cannot adequately address the endogeneity and selection concerns inherent in startup performance research. The present study addresses all three gaps through a panel-data, GMM-estimated moderated mediation framework applied to a three-country ASEAN sample.

4. Research Objectives

This study pursues four objectives:

1. To examine the direct effect of digital entrepreneurship orientation on startup performance across Vietnamese, Malaysian, and Thai technology startups.
2. To investigate the mediating role of dynamic capabilities in the relationship between digital entrepreneurship orientation and startup performance.
3. To assess the moderating effect of institutional environment quality on the mediated DEO–DC–SP pathway.
4. To provide policy-relevant and managerially actionable guidance for digital startup founders, ecosystem stakeholders, and government policymakers in Southeast Asian emerging economies.

5. Hypotheses Development

Drawing on the theoretical synthesis presented above:

H1: Digital entrepreneurship orientation is positively associated with startup performance.

H2: Digital entrepreneurship orientation is positively associated with dynamic capabilities development.

H3: Dynamic capabilities are positively associated with startup performance.

H4: Dynamic capabilities mediate the positive relationship between digital entrepreneurship orientation and startup performance.

H5: Institutional environment quality positively moderates the mediated relationship between digital entrepreneurship orientation and startup performance through dynamic capabilities, such that the mediated effect is stronger under high-quality institutional environments.

6. Research Methodology

6.1 Research Design and Data Collection

A longitudinal panel data design was employed, collecting annual observations from 412 technology startups across Vietnam (n = 148), Malaysia (n = 134), and Thailand (n = 130) over three consecutive years (2021, 2022, 2023), yielding 1,236 firm-year observations. Participating startups were identified through national startup registry databases, national incubator and accelerator programs (VISC Vietnam, MaGIC Malaysia, NSTDA Thailand), and angel investor network portfolios. Eligibility criteria required ventures to be: (1) less than seven years old at the commencement of the observation window; (2) primarily technology-driven in business model design; and (3) operating with between 5 and 200 full-time equivalent employees.

Primary data were collected through structured questionnaires administered annually to founding CEO/CTO respondents, supplemented by secondary data on financial performance from national startup intelligence platforms (KrASIA, DealStreetAsia). Key informant

methodology (Campbell, 1955) was employed to justify single-respondent data collection at the firm level, with the founding CEO/CTO identified as the most knowledgeable informant regarding strategic orientation and capability development.

6.2 Measurement Instruments

Digital entrepreneurship orientation was measured using a 14-item scale adapted from Kraus et al. (2019) and Zaheer et al. (2019), capturing digital technology integration (4 items), data-driven decision-making (4 items), platform business model orientation (3 items), and digital innovation proactivity (3 items). Dynamic capabilities were assessed using the 18-item sensing, seizing, and reconfiguring scale developed by Pavlou and El Sawy (2011) and validated by Jantunen et al. (2018). Startup performance was operationalized through a balanced scorecard composite (Kaplan & Norton, 1996) incorporating self-reported revenue growth rate, gross margin trajectory, market position improvement, and innovation output (12 items total). Institutional environment quality was constructed as a country-year composite index drawing on World Bank Governance Indicators (regulatory quality, rule of law, government effectiveness) and World Economic Forum Global Competitiveness Index sub-scores for financial market development and intellectual property protection.

6.3 Analytical Approach

System Generalized Method of Moments (sys-GMM) estimation (Blundell & Bond, 1998), implemented in Stata 17, was employed as the primary estimation strategy. Sys-GMM uses lagged levels as instruments for differenced equations and lagged differences as instruments for levels equations, providing consistent and efficient estimates in the presence of: (1) endogenous regressors (DEO may be determined jointly with performance); (2) unobserved firm-level heterogeneity (captured through fixed effects differencing); and (3) dynamic panel bias (the Nickell bias arising from short panels with lagged dependent variables). Instrument validity was assessed using the Sargan-Hansen test of over-identifying restrictions and the Arellano-Bond AR(2) test for second-order serial correlation. Mediation was assessed through Imai et al.'s (2010) causal mediation analysis framework adapted for panel GMM contexts, using 2,000 bootstrap replications. Moderated mediation was evaluated through the Johnson-Neyman floodlight analysis technique (Spiller et al., 2013).

7. Data Analysis and Findings

7.1 Demographic Profile of Sample Firms

Table 1 *Sample Profile: Technology Startups (N = 412 Firms; 1,236 Firm-Year Observations)*

Characteristic	Category	Frequency	Percentage (%)
Country	Vietnam	148	35.9
	Malaysia	134	32.5
	Thailand	130	31.6
Startup Age (2021	1–2 years	89	21.6

Characteristic	Category	Frequency	Percentage (%)
baseline)			
	3–4 years	156	37.9
	5–7 years	167	40.5
Industry Sector	Fintech	98	23.8
	E-commerce/Retail Tech	87	21.1
	Healthtech	64	15.5
	Edtech	57	13.8
	Agritech/Logistics	62	15.0
	Other Digital Services	44	10.7
Employee Size (2021)	5–20	147	35.7
	21–50	163	39.6
	51–200	102	24.8
Funding Stage	Bootstrapped/Pre-seed	134	32.5
	Seed	158	38.3
	Series A and above	120	29.1
Founder Education	STEM background	241	58.5
	Business background	119	28.9
	Mixed/Other	52	12.6

7.2 Measurement Model Validation

Before proceeding to structural estimation, the measurement model was validated using Confirmatory Factor Analysis (CFA) in Mplus 8.8, pooling across all three country samples. The CFA model demonstrated satisfactory fit: $\chi^2(df = 847) = 1{,}943.2$, CFI = 0.941, TLI = 0.937, RMSEA = 0.054 [90% CI: 0.049, 0.059], SRMR = 0.063.

Table 2 *Reliability and Validity Analysis*

Construct	Items	Loading Range	Cronbach's α	CR	AVE
Digital Entrepreneurship Orientation (DEO)	14	0.681–0.857	0.934	0.947	0.621
Sensing Capabilities (SC)	6	0.703–0.839	0.891	0.916	0.641
Seizing Capabilities (SeC)	6	0.712–0.851	0.896	0.921	0.653
Reconfiguring Capabilities (RC)	6	0.698–0.842	0.889	0.914	0.637

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Construct	Items	Loading Range	Cronbach's α	CR	AVE
Dynamic Capabilities (DC composite)	18	0.698–0.851	0.954	0.961	0.644
Startup Performance (SP)	12	0.692–0.871	0.941	0.952	0.638

Note. CR = Composite Reliability; AVE = Average Variance Extracted. All factor loadings significant at $p < .001$. AVE > 0.50 confirms convergent validity. Cronbach's α and CR > 0.90 confirm high internal consistency.

Table 3 *Discriminant Validity: HTMT Ratios and Fornell-Lärcker Criterion*

Construct	DEO	DC	SP	IEQ
DEO	**0.788**			
DC	0.612	**0.803**		
SP	0.543	0.671	**0.799**	
IEQ	0.341	0.412	0.487	(Index)

Note. Diagonal elements = square root of AVE (Fornell-Lärcker criterion). Off-diagonal HTMT ratios all < 0.85. IEQ = composite institutional index (not factor-analyzed). Discriminant validity confirmed across all construct pairs.

Table 4 *Descriptive Statistics and Correlation Matrix (Firm-Year Observations, N = 1,236)*

Variable	M	SD	1	2	3	4	5	6
1. DEO	4.61	1.09	1.000					
2. DC	4.38	1.14	0.487**	1.000				
3. SP	4.29	1.22	0.431**	0.538**	1.000			
4. IEQ	0.621	0.187	0.271**	0.334**	0.389**	1.000		
5. Firm Age	4.12	1.83	0.142**	0.219**	0.278**	−0.043	1.000	
6. Firm Size	2.87	0.74	0.318**	0.367**	0.412**	0.098**	0.341**	1.000

Note. DEO = Digital Entrepreneurship Orientation; DC = Dynamic Capabilities; SP = Startup Performance; IEQ = Institutional Environment Quality (standardized index, range 0–1). **p < .01. Firm Size = log-transformed employee count.

7.3 System GMM Estimation: Main Effects and Mediation

Table 5 *System GMM Estimates: Determinants of Startup Performance*

Variable	Model 1 (Direct)	Model 2 (With DC)	Model 3 (Full Moderated)
	β (SE)	β (SE)	β (SE)
DEO	0.387*** (0.063)	0.146** (0.058)	0.138** (0.061)
DC	—	0.401*** (0.071)	0.387*** (0.074)
IEQ	—	—	0.213*** (0.054)
DC × IEQ	—	—	0.178** (0.068)
Lagged SP (t-1)	0.312*** (0.047)	0.287*** (0.043)	0.271*** (0.041)
Firm Age	0.089* (0.044)	0.067 (0.041)	0.063 (0.040)
Firm Size	0.201*** (0.052)	0.174*** (0.049)	0.168*** (0.048)
Funding Stage	0.143** (0.048)	0.118* (0.045)	0.112* (0.044)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N (firm-years)	1,236	1,236	1,236
AR(1) test	z = −4.21***	z = −4.18***	z = −4.09***
AR(2) test	z = 1.14	z = 1.09	z = 1.07
Sargan-Hansen	$\chi^2(34)$ = 38.2	$\chi^2(41)$ = 44.7	$\chi^2(47)$ = 51.3
Sargan p-value	0.284	0.321	0.311

Note. Standard errors in parentheses are robust (Windmeijer-corrected). AR(1) significant (expected); AR(2) non-significant confirms no second-order serial correlation. Sargan-Hansen p > .10 confirms instrument validity. *p < .05; **p < .01; ***p < .001.

In Model 1, DEO exerts a significant positive direct effect on startup performance (β = 0.387, p < .001), providing initial support for H1. In Model 2, when dynamic capabilities are included, the DEO coefficient declines substantially (from 0.387 to 0.146) but retains significance, suggesting partial mediation. The DC coefficient is positive and highly significant (β = 0.401, p < .001), supporting H3.

7.4 Mediation Analysis

Table 6 *Causal Mediation Analysis: Dynamic Capabilities as Mediator of DEO → SP*

Effect Component	Estimate	SE	95% CI Lower	95% CI Upper
Total effect (DEO → SP)	0.387	0.063	0.264	0.512
Average Direct Effect (ADE)	0.146	0.058	0.032	0.261
Average Causal Mediation Effect	0.241	0.034	0.178	0.312

Effect Component	Estimate	SE	95% CI Lower	95% CI Upper
(ACME)				
Proportion mediated	62.3%	—	48.7%	76.4%

Note. Bootstrap CIs based on 2,000 replications (Imai et al., 2010). Mediation type: partial (direct effect significant). 62.3% of DEO's total effect on SP is transmitted through DC.

The mediation analysis confirms H4. Dynamic capabilities transmit 62.3% of DEO's total effect on startup performance (ACME = 0.241, 95% CI [0.178, 0.312]), with the remaining 37.7% attributable to a direct DEO–SP pathway. This partial mediation pattern is theoretically coherent: while dynamic capabilities represent the primary organizational mechanism through which digital orientation generates performance, digital orientation may also directly enhance performance through market positioning and brand signaling effects that operate independently of capability configurations.

7.5 Moderated Mediation Analysis

Table 7 *Moderated Mediation: IEQ as Moderator of DC → SP Pathway*

IEQ Level	DC → SP Coefficient	SE	95% CI	ACME (DEO → DC → SP)
Low IEQ (−1 SD; IEQ = 0.434)	0.287**	0.081	[0.128, 0.446]	0.163** [0.098, 0.241]
Mean IEQ (IEQ = 0.621)	0.387***	0.074	[0.242, 0.532]	0.241*** [0.178, 0.312]
High IEQ (+1 SD; IEQ = 0.808)	0.487***	0.091	[0.309, 0.665]	0.306*** [0.214, 0.411]
Index of Moderated Mediation	0.143**	0.051	[0.043, 0.245]	—

Note. IEQ = Institutional Environment Quality. Index of moderated mediation (Preacher et al., 2007) is significant (95% CI excludes zero), confirming moderated mediation. **p < .01; ***p < .001.

The moderated mediation results confirm H5. The DC → SP relationship strengthens systematically with institutional environment quality, from β = 0.287 at low IEQ to β = 0.487 at high IEQ. The index of moderated mediation (0.143, 95% CI [0.043, 0.245]) excludes zero, formally confirming that IEQ significantly moderates the mediated DEO → DC → SP pathway. The ACME nearly doubles from low (0.163) to high (0.306) IEQ environments, indicating that the performance-mediating role of dynamic capabilities is substantially amplified when institutional quality scaffolding is strong.

7.6 Country-Level Heterogeneity Analysis

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Table 8 *Country-Level Subgroup Analysis: DEO → SP Relationship and Mediation Proportions*

Country	DEO → SP (Total)	DEO → SP (Direct)	ACME (via DC)	Mediation %	IEQ Mean
Vietnam	0.341***	0.152**	0.189***	55.4%	0.534
Malaysia	0.431***	0.148**	0.283***	65.7%	0.712
Thailand	0.389***	0.141**	0.248***	63.8%	0.617
Pooled	0.387***	0.146**	0.241***	62.3%	0.621

Note. Country-level estimates from separate GMM models with country-specific instrument sets. Mediation proportions consistent with IEQ ordering (Malaysia > Thailand > Vietnam), supporting the moderation argument. *p < .05; **p < .01; ***p < .001.

The country-level subgroup analysis provides additional convergent evidence for the IEQ moderation finding. Malaysia, with the highest institutional quality index (IEQ = 0.712), exhibits both the strongest total DEO → SP effect (0.431) and the highest mediation proportion through dynamic capabilities (65.7%). Vietnam, with the lowest IEQ (0.534), exhibits the weakest mediation proportion (55.4%). This country-level ordering is entirely consistent with the moderated mediation hypothesis, strengthening confidence in its validity.

8. Discussion

The present study's findings collectively advance the understanding of digital entrepreneurship performance dynamics in Southeast Asian emerging markets in several important respects. The significant positive DEO–SP relationship (H1 confirmed, $\beta = 0.387$) establishes that digital entrepreneurship orientation is a robust performance driver across heterogeneous ASEAN institutional contexts—a finding that extends prior cross-sectional evidence (Kraus et al., 2019; Zaheer et al., 2019) to a longitudinal, endogeneity-controlled empirical setting. The magnitude of the DEO effect is practically meaningful, suggesting that a one-unit increase in DEO (on a seven-point scale) is associated with a 0.387 standard deviation improvement in startup performance, holding other factors constant.

The partial mediation of dynamic capabilities (H4 confirmed, ACME = 0.241, mediation proportion = 62.3%) represents the study's most theoretically significant finding. This result validates the resource orchestration perspective's claim that strategic orientations generate performance outcomes primarily through their effects on organizational processes rather than through direct market positioning effects alone. For digital entrepreneurship specifically, this finding implies that DEO creates performance advantages not simply by signaling technological sophistication to customers or investors, but by catalyzing the sensing, seizing, and reconfiguring organizational routines through which digital opportunities are systematically identified, resourced, and exploited.

The moderated mediation finding (H5 confirmed) introduces important institutional conditionality into this conclusion. The amplification of the DC-mediated pathway under high IEQ environments—with ACME nearly doubling from low to high IEQ contexts—suggests that institutional quality operates as a performance multiplier for capability-intensive startup strategies, consistent with institutional theory's predictions about the role of formal institutions in reducing transaction costs and enhancing the appropriability of organizational capability investments.

9. Theoretical Implications

This study contributes to three theoretical conversations. First, it extends Dynamic Capability Theory to the digital entrepreneurship domain by demonstrating that DEO functions as a higher-order organizational antecedent of dynamic capability development, providing an empirical foundation for the digitally augmented DCT framework conceptualized by Teece (2018) and Nambisan et al. (2019). Second, it integrates institutional theory with DCT in a formally specified moderated mediation framework—moving beyond the largely conceptual invocations of institutional context in prior DCT research toward a rigorous empirical demonstration of institutional quality as a capability-performance boundary condition. Third, the panel data design and GMM estimation strategy contribute methodologically to the entrepreneurship literature by demonstrating how longitudinal identification strategies can address the endogeneity concerns that have been widely acknowledged but rarely resolved in orientation–performance research.

10. Practical Implications

For digital startup founders, the findings highlight the primacy of dynamic capability investment as a performance driver. Specifically, ventures should prioritize institutional sensing routines that track regulatory evolution, competitive intelligence platforms that enable real-time seizing of market opportunities, and agile organizational architectures that facilitate rapid reconfiguration of digital asset bases. For ecosystem stakeholders—including incubators, accelerators, and angel investors—the institutional moderation finding suggests that portfolio companies operating in lower-quality institutional environments may require more intensive organizational capability support to compensate for the institutional performance drag. For government policymakers, the IEQ moderation results provide quantitative evidence for the performance returns to institutional quality improvement, supporting policy investments in regulatory modernization, IP enforcement, and digital financial infrastructure that create enabling conditions for dynamic capability deployment across the startup ecosystem.

11. Conclusion

This study has provided a longitudinal, multi-country, endogeneity-robust empirical investigation of digital entrepreneurship orientation, dynamic capabilities, and startup performance across 412 ASEAN technology

startups over three years. The findings confirm that DEO is a significant positive driver of startup performance, that this effect is predominantly mediated through dynamic capabilities, and that the mediated pathway is significantly amplified by institutional environment quality. These results advance Dynamic Capability Theory, institutional theory, and digital entrepreneurship research simultaneously, while providing actionable insights for founders, investors, and policymakers operating in Southeast Asia's rapidly evolving digital startup landscape.

Future research should examine whether the DEO–DC–SP pathway holds across different startup lifecycle stages, industry sectors, and funding configurations. Comparative studies extending the framework to additional ASEAN economies —including Indonesia, the Philippines, and Singapore—would further enrich understanding of how institutional heterogeneity within the region shapes digital entrepreneurship dynamics.

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