Innovation Sustainability in Tourism: The Impact of Digital Entrepreneurship with Financial Access as a Moderator

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ABSTRACT

This study examined the relationship between digital entrepreneurship and innovation sustainability in Kuching's tourism sector, with access to financial resources as a moderating factor. Four dimensions of digital entrepreneurship were investigated which are Digital Technology Behaviors (DTB), Digital Entrepreneurship Capability (DEC), Digital Infrastructure (DI) and Digital Business Model (DBM). A quantitative design was employed using survey data from 486 tourism enterprises across nine subsectors in Kuching, Sarawak. Grounded in Resource-Based View and Dynamic Capabilities Theory, the study utilized Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyze direct and moderated relationships. All four digital entrepreneurship dimensions significantly influenced innovation sustainability, with DTB (β=0.599) and DI (β=0.526) showing the strongest direct effects, followed by DBM (β=0.515) and DEC (β=0.368). Critically, Access to Financial Resources significantly moderates only the relationship between DBM and Innovation Sustainability (β=0.400, p<0.001), while moderating effects on DTB, DEC and DI relationships were non-significant. The model explained 60.3% of variance in innovation sustainability. Digital business model innovation and infrastructure development are the most impactful drivers of sustainable innovation in tourism, but they operate through different mechanisms. Financial resources substantially enhance business model innovation outcomes while technological behavior and entrepreneurial capabilities depend more on knowledge and skills than financial access. The study extends Resource-Based View theory by demonstrating that not all digital resources are equally reliant on financial capital. Practically, tourism enterprises should prioritize business model innovation and infrastructure investment, while policymakers should develop targeted financial schemes supporting digital business model experimentation and scaling in regional tourism contexts.

Keywords: Digital Entrepreneurship, Innovation Sustainability, Access to Financial Resources, Tourism Sector, PLS-SEM, Kuching

INTRODUCTION

Research Background

The global tourism industry is undergoing major digital changes that bring new opportunities for innovation, efficiency, and long-term competitiveness. In this context, digital entrepreneurship using digital technologies strategically to create and expand value has become a key driver of organizational growth and innovation (Nambisan et al., 2023). Nevertheless, the link between digital entrepreneurship and sustained innovation is still not well understood, especially in regional tourism sectors where businesses often face uncertain markets and limited resources (Zhao & Lucas, 2024). Innovation sustainability refers to a firm's ongoing ability to create, implement and improve innovative products, services, and processes (Chen & Kumar, 2025), representing a

dynamic capability that blends human knowledge with technological tools to support continuous improvement and strategic adaptation (Rodriguez et al., 2024). In tourism, this capability helps organizations respond to environmental changes while maintaining resilience and long-term competitiveness (Harsono et al., 2024). Kuching, Sarawak offers a useful setting to study these dynamics as the region advances digital transformation through the Sarawak Digital Economy Blueprint 2030 (Sarawak Multimedia Authority, 2020). Although digital technologies can lower operational costs and improve customer engagement (Nambisan et al., 2019), tourism businesses in the region still face challenges including inconsistent digital infrastructure, uneven technology adoption, and limited financial access for digital transformation efforts (Fuerst et al., 2023).

Research Objectives

Accordingly, the objectives of this study are as follows:

1. To examine the relationship between digital entrepreneurship and innovation sustainability in the tourism sector.
2. To assess the impact of access to financial resources on innovation sustainability among tourism-related enterprises.
3. To determine the moderating effect of access to financial resources on the relationship between digital entrepreneurship and innovation sustainability in the tourism sector.

LITERATURE REVIEW

Theoretical Foundations

This study integrates three complementary theories. Technology Adoption and Diffusion Theory (Rogers, 2003) explain how digital technology behaviors influence innovation outcomes (Scuotto et al., 2024). The Resource-Based View (RBV) (Barney, 1991) posits that resources must be valuable, rare, inimitable, and organized to provide sustained competitive advantage. Digital entrepreneurship dimensions viewed as strategic resources, with financial resources acting as enablers (Barney & Clark, 2020). Dynamic Capabilities Theory (Teece, 2007) explains how firms' sense, seize and transform resources to maintain competitiveness in rapidly changing environments.

Innovation Sustainability (IS)

Innovation sustainability refers to organizational practices that support continuous improvement and long-term performance (Bernal-Torres et al., 2021). In tourism, it means the ability of organizations and destinations to regularly improve services, products and management practices to stay competitive. This can be achieved by updating tourism offerings, adopting new technologies and improving operations to meet changing tourist expectations. By enhancing processes, knowledge systems and daily operations, tourism organizations can maintain ongoing innovation that boosts service quality and visitor satisfaction (Sesar, 2024). For instance, tourism providers may use digital booking platforms, online marketing and sustainable practices to improve efficiency and tourist experience. These efforts help tourism businesses remain adaptable, strengthen competitiveness and support long-term destination sustainability.

Digital Entrepreneurship (DE)

In literature, digital entrepreneurship is a multidimensional concept that reflects how businesses use digital technologies to create value and remain competitive. One important dimension is Digital Technology Behavior (DTB), which refers to the initiative-taking use of digital tools in daily operations and customer engagement, helping firms respond to changing market demands (Nambisan, 2023; Fuerst et al., 2023). Another key dimension is Digital Entrepreneurship Capability (DEC), which focuses on the organization's ability to identify and take advantage of digital opportunities through skills such as digital literacy, opportunity recognition, and effective coordination of resources (Xu et al., 2022). In addition, Digital Infrastructure (DI) highlights the importance of having the necessary technological systems in place, such as reliable internet, cloud services, and digital payment methods, to support digital activities (Fuerst et al., 2023). Lastly, Digital Business Model (DBM)

refers to how businesses use digital technologies to redesign their value offerings, revenue streams, and ways of interacting with customers (Veit et al., 2022). Together, these dimensions provide a clear and simple framework for understanding digital entrepreneurship in this study.

Access to Financial Resources as Moderator

Access to financial resources (AFR) refers to the ability to obtain external financing for entrepreneurial activities (Krasniqi, 2022). From an RBV perspective, financial capital enables firms to acquire complementary assets for strategic renewal (Kraus et al., 2018). However, recent studies suggest that financial resources alone are insufficient as their effectiveness depends on how well they are integrated with strategic skills (Nambisan et al., 2023).

Conceptual Framework

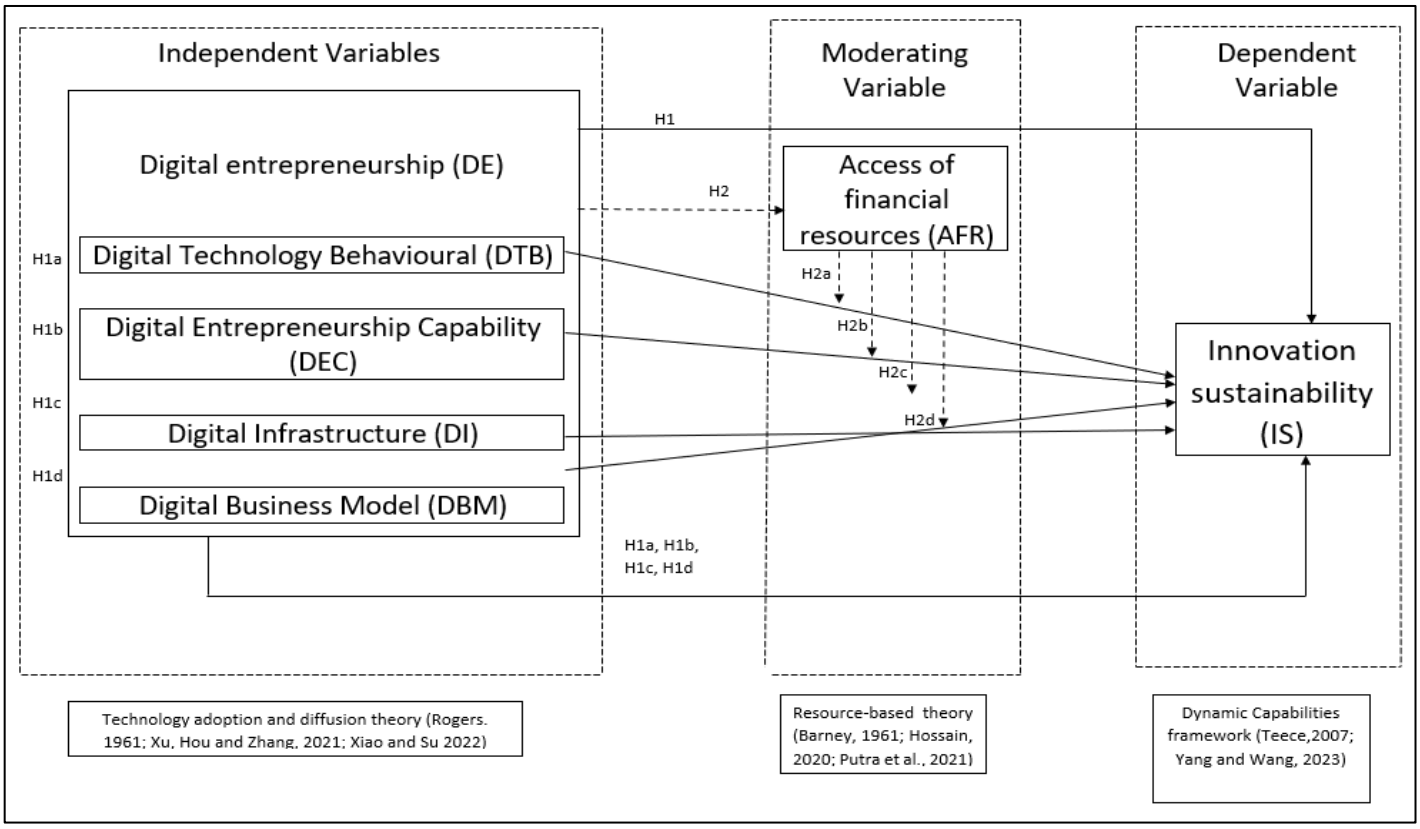

Figure 1: Conceptual framework of digital entrepreneurship on innovation sustainability

RESEARCH METHODOLOGY

This study adopted a quantitative cross-sectional research design to examine the relationships among digital entrepreneurship, innovation sustainability and access to financial resources within tourism enterprises in Kuching. Data was collected through a structured survey and the analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS 4, which is well-suited for handling complex research models and exploratory studies (Hair et al., 2022). The target population consisted of 486 tourism enterprises spanning nine subsectors, selected through purposive sampling. To ensure relevance and data quality, the inclusion criteria required businesses to be actively engaged in digital entrepreneurship, have at least two years of operational experience and involve respondents holding managerial positions.

Data collection was conducted using a structured questionnaire adapted from validated measurement scales. The survey was distributed online through Google Forms over a two-month period with follow-up reminders issued to enhance response rates. For data analysis, the study followed the two-step approach proposed by Anderson and Gerbing (1988), beginning with the assessment of the measurement model, followed by evaluation of the structural model. Additionally, common method bias was examined using full collinearity testing as

recommended by Kock and Lynn (2012), with all variance inflation factors (VIF) values remaining below the threshold of 3.3, indicating that common method bias was not a concern in this study.

RESULTS AND FINDINGS

Respondent Profile

The 486 respondents comprised 247 males (50.8%) and 239 females (49.2%), representing balanced gender representation. Age distribution was diverse: 18-28 years (21.6%), 29-39 years (18.7%), 40-50 years (22.2%), 51-61 years (19.3%), and 62+ years (18.1%). Respondents occupied various roles: department managers (34.8%), business owners (33.1%), and others (32.1%). Experience levels ranged from less than 3 years (22.4%) to more than 15 years (16.5%), with balanced representation across experience categories.

Measurement Model Assessment

Internal Consistency Reliability

Items	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Access to Financial Resources (AFR)	0.865	0.911	0.915	0.783
Digital Business Model (DBM)	0.821	0.906	0.854	0.500
Digital Entrepreneurship Capability (DEC)	0.899	0.977	0.911	0.634
Digital Infrastructure (DI)	0.827	0.868	0.871	0.539
Digital Technology Behaviour (DTB)	0.883	0.887	0.913	0.639
Innovation sustainability (IS)	0.779	0.855	0.85	0.593

Table 1: Cronbach's alpha, composite reliability and AVE

Convergent Validity

Average Variance Extracted (AVE) values for all constructs exceeded the minimum threshold of 0.50, confirming adequate convergent validity (Fornell & Larcker, 1981). AFR demonstrated the highest AVE (0.737), followed by DI (0.683), DTB (0.639), DEC (0.627), IS (0.591), and DBM (0.547).

Discriminant Validity

Items	**Heterotrait-monotrait ratio (HTMT)**
IS <-> DTB	0.728
IS <-> DI	0.690
DBM <-> AFR	0.677
DI <-> AFR	0.670

DEC <-> AFR	0.643
IS <-> DBM	0.630
DTB <-> AFR	0.564
IS <-> DEC	0.516
IS <-> AFR	0.509

Table 2: Heterotrait-Monotrait Ratio (HTMT)

Structural Model Assessment

Direct Relationships

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation	P Values
IS ← AFR	0.296	0.301	0.035	0.000
IS ← DBM	0.515	0.519	0.019	0.000
IS ← DEC	0.368	0.374	0.026	0.000
IS ← DI	0.526	0.530	0.024	0.000
IS ← DTB	0.599	0.601	0.023	0.000

Table 3: Direct relationships bootstrapping results

Digital Technology Behavior (DTB) demonstrated the strongest direct effect on Innovation Sustainability ($\beta = 0.599$, $p < 0.001$), followed by Digital Infrastructure (DI: $\beta = 0.526$, $p < 0.001$), Digital Business Model (DBM: $\beta = 0.515$, $p < 0.001$), Digital Entrepreneurship Capability (DEC: $\beta = 0.368$, $p < 0.001$), and Access to Financial Resources (AFR: $\beta = 0.296$, $p < 0.001$).

Moderating Effects

Interaction Path	Original Sample (O)	Sample Mean (M)	Standard Deviation	p-Values
AFR × DI → IS	0.000	-0.002	0.063	0.995
AFR × DBM → IS	0.400	0.399	0.029	0.000
AFR × DEC → IS	-0.030	-0.034	0.059	0.615
AFR × DTB → IS	-0.009	-0.013	0.049	0.859

Table 4: Moderating relationships bootstrapping results

The results reveal that AFR significantly moderates only the relationship between Digital Business Model and Innovation Sustainability ($\beta = 0.400$, $p < 0.001$). The moderating effects on relationships involving Digital Infrastructure ($p = 0.995$), Digital Entrepreneurship Capability ($p = 0.615$) and Digital Technology Behavior ($p = 0.859$) were not statistically significant.

Explanatory Power (R^2)

The R^2 value for Innovation Sustainability was 0.603, indicating that the model explains 60.3% of the variance in the dependent variable. This exceeds the threshold of 0.50 for moderate explanatory power and approaches the substantial range (Hair et al., 2022).

Effect Sizes (f^2)

Path	f^2	Effect Size
DEC → IS	0.35	Large
DBM → IS	0.22	Medium
DTB → IS	0.20	Medium
AFR → IS	0.18	Medium
AFR × DBM → IS	0.15	Medium
DI → IS	0.12	Small

Table 5: f-squared effect sizes

Predictive Power (PLSpredict)

Q^2_predict values for indicators exceeded zero, confirming the model's predictive relevance. The PLS-SEM model demonstrated lower prediction errors (RMSE, MAE) compared to the linear model benchmark indicating medium to high predictive power.

Summary of Hypotheses Testing

Path	Result
DTB → IS	Supported
DEC → IS	Supported
DI → IS	Supported
DBM → IS	Supported
AFR × DBM → IS	Supported

Table 6: Summary of hypotheses results

DISCUSSION

Direct Effects of Digital Entrepreneurship Dimensions

The significant direct effects confirm that all four digital entrepreneurship dimensions are critical for innovation sustainability. DTB emerged as the strongest predictor, underscoring the importance of initiative-taking digital engagement. This aligns with Technology Adoption Theory, where effective implementation, not just adoption but drives innovation outcomes (Rogers, 2003). From a Dynamic Capabilities perspective, such behavior reflects a firm's ability to sense and respond to digital opportunities.

DI's strong effect reinforces RBV logic: infrastructure is a foundational resource for digital strategy implementation (Barney, 1991). In Kuching, where infrastructure gaps were identified as key constraints, this finding highlights the importance of foundational digital assets.

DBM's substantial direct effect supports RBV's emphasis on higher-order resource utilization. Business model innovation recombines digital technologies with organizational capabilities to create strategic assets (D'Oria et

al., 2021). DEC, while significant had the smallest direct effect suggesting that digital capabilities may require complementary resources to fully translate into sustained innovation.

The Moderating Role of Access to Financial Resources

The most significant finding concerns AFR's differential moderating effects. AFR significantly moderated only the DBM-IS relationship ($\beta=0.400$, $p<0.001$), supporting H2d but rejecting H2a, H2b, and H2c.

The significant DBM moderation indicates financial accessibility enhances business model innovation outcomes. Business model innovation inherently involves experimentation, platform development and risk-taking activities requiring substantial financial investment (Chesbrough, 2010). Tourism enterprises with greater financial access can more effectively scale innovative business models and sustain experimentation.

Theoretical Contributions

This study makes several theoretical contributions. First, it extends the Resource-Based View by demonstrating that not all digital resources are equally reliant on financial capital. While DBM requires substantial financial investment to scale, DTB and DEC are more dependent on knowledge and skills. This nuanced understanding addresses conceptual ambiguity in the literature regarding the role of financial resources in digital entrepreneurship (Lee et al., 2025; Tan & Mahmud, 2026).

Second, the findings support Dynamic Capabilities Theory by showing that digital entrepreneurship dimensions represent higher-order competencies. The varying effects of DTB, DEC, DBM and DI highlight that sensing, seizing and transforming capabilities operate through distinct mechanisms with different resource dependencies. For instance, seizing capabilities (DBM) are more financially sensitive than sensing capabilities (DTB).

Third, the study advances Technology Adoption Theory by demonstrating that adoption behaviors alone are insufficient for sustaining innovation. Instead, strategic integration through business model innovation is required to drive long-term outcomes (Scuotto et al., 2024). This shifts the focus from binary adoption to continuous digital utilization as a driver of innovation.

Practical Implications

For tourism enterprises, the findings suggest prioritizing digital business model innovation and infrastructure investment. While digital behaviors and capabilities are important, their impact is amplified when complemented by structural investments. For policymakers, targeted financial schemes that support business model experimentation are essential as AFR significantly enhances DBM outcomes. Continued investment in digital infrastructure remains critical as DI exerts strong direct effects independent of firm-level financial access.

Limitations and Future Research

The cross-sectional design limits causal inference. The study’s focus on Kuching’s tourism sector restricts generalizability. Single-respondent data may introduce bias. Future research should employ longitudinal designs, comparative studies across regions and sectors and qualitative methods to explore the mechanisms underlying the moderating role of financial resources.

CONCLUSION

This study examined the relationships between digital entrepreneurship dimensions and innovation sustainability in Kuching’s tourism sector with access to financial resources as a moderator. All four dimensions which are DTB, DI, DBM and DEC significantly influence innovation sustainability. Critically, financial access enhances only the DBM–IS relationship indicating that business model innovation is the most financially sensitive driver of sustained innovation. The findings extend RBV by revealing differential resource dependencies and offer practical guidance for enterprises and policymakers aiming to foster sustainable innovation in regional tourism contexts.

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