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TECHNOLOGY ADOPTION AND COMPETITIVE ADVANTAGE: THE ROLE OF DIGITAL PAYMENTS IN TOURISM MSME PERFORMANCE

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ABSTRACT
This study investigates the impact of the digital payment adoption on the business performance of the tourism micro, small, and medium enterprises (MSMEs) in the Likupang Special Economic Zone of Indonesia. Using a combination of the Technology Acceptance Model, the Resource-Based View, Dynamic Capability Theory, and Institutional Theory, the study examines survey data from 284 MSMEs and 18 stakeholder interviews. Results show that perceived usefulness and ease of use are essential factors for adoption. In addition, the greater the adoption of digital payments within the organization, the stronger the organizational capabilities (β = 0.41), which positively affect competitive advantage (β = 0.38) and, subsequently, business performance (β = 0.33). Network reliability, transparent merchant discount rates, and successful onboarding are institutional facilitators that significantly moderate the adoption-performance relationship (β = 0.12, p = 0.009). Sub-sectoral analysis reveals that accommodation and food and beverage have the highest transaction intensity and service integration, enabling substantial benefits, whereas transformations in transport and retail are minimal. The study shows that the strategic value of digital payments can be generated only if they are part of dynamic capacity-building processes and underpinned by facilitating institutional conditions. These results contradict the belief that direct digital adoption enhances MSME performance, as local institutional and human factors mediate this relationship, providing a context-dependent extension of the digital transformation theory in emergent tourist economies.

INTRODUCTIONS

Digital transformation of Micro, S, and Medium Enterprises (MSMEs) is taking off globally. Since digital technology is essential for competitiveness, operational sustainability, and market accessibility, this is especially true

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for tourism-based economic systems. (Buhalis et al., 2022; Subekti & Novianti, 2025). Given that cash remains the most commonly used form of payment in emerging destinations and that digital infrastructure is disproportionately underdeveloped, the adoption of digital payments is both a strategic opportunity and a system challenge. (Susanto, 2022; Wu et al., 2024). Digital exclusion is particularly pronounced among tourism MSMEs, which are often owner-operated, resource-constrained, and located in informal networks, and that benefit from a factor of success in adopting digital technologies, as they enable efficiency in transactions, data-driven decision-making, and customer-centric experiences. (S. K. Rahayu et al., 2023; Sharma & Sharma, 2024)

The Likupang Special Economic Zone (SEZ) in Indonesia, designated as a national priority tourism destination in 2019, exemplifies this tension. Although the government vigorously promotes QRIS (Quick Response Code Indonesian Standard) as a universal payment platform, its use among the 1,247 tourism MSMEs in the zone is not widespread.(Arina et al., 2025) According to the latest data, only three out of every five MSMEs engage with any digital channel as of 2024, due to unreliable internet connectivity (67.4% of firms), low digital literacy among owners (53.7%), and obscure merchant discount rate (MDR) systems still in place. (Arina et al., 2024; Muchtar et al., 2024; Utomo & Setiyono, 2024). Not only do these restrictions make it challenging to achieve transactional efficiency, but they also limit firms' ability to use payment information strategically, which is a vital gap in an increasingly competitive tourism environment.

Although the previous literature shows a correlation between technology adoption and firm performance (Chatterjee et al., 2021; Tamilmani et al., 2021), it still contains three significant theoretical and empirical gaps. To begin with, the mechanisms mediating the relationship between digital payment adoption and competitive outcomes are under-theorized. The vast majority of the research treats adoption as an immediate predictor of performance (e.g., Rahayu et al. 2022), overlooking that generic technologies are turned into firm-specific capabilities through the process of organizational integration. (Hsiao, 2025; R. Rahayu et al., 2022; Zhang et al., 2023)

Second, institutional ecosystems as moderating factors, especially in SEZs, are not specified adequately. Even though institutional theory indicates that regulatory, normative, and mimetic pressures are relevant in the adoption (DiMaggio & Powell, 1983) Recent empirical studies demonstrate that practical pressures, including network reliability, MDR transparency, and bundled onboarding, are determinants in turning adoption into actual performance. (Utomo & Setiyono, 2024; Wu et al., 2024)

Third, the heterogeneity in value capture at the sub-sectoral level is largely neglected. There is some emerging evidence that transaction intensity, service bundling, and integration potential revert to digital investment. (Farah et al., 2025; Kumar et al., 2023). For example, accommodation and food and beverage (F&B) MSMEs have greater performance improvements than transport or retail, due to higher transaction frequency and greater data flow. (Haryani et al., 2024; NP et al., 2022; Resmi et al., 2021).

This paper fills these gaps by posing the following question:

(1) What are the antecedents that contribute to the adoption of digital payments by tourism MSMEs?

(2) How does adoption work through organizational and strategic channels to create competitive advantage and business performance?

(3) Moderating these relationships by institutional support and sub-sectoral context?

Basing our study on a synthesized theoretical framework that combines the Technology Acceptance Model (TAM) with the Resource-Based View (RBV), the Dynamic Capabilities Theory (DCT), and institutional views, we would survey 284 tourism MSMEs and conduct 18 stakeholder interviews across five subsectors of Likupang SEZ. We have identified a sequential value-creation process involving the adoption and development of organizational capabilities, the creation of competitive advantage, and performance, all of which are supported by institutional factors and dependent on sub-sectoral conditions.

Theoretically, we contribute to explaining the micro-principles of developing digital capability in resource-constrained environments. We offer empirically solid structural equation modelling (SEM) evidence in a high-stakes SEZ setting, triangulated with qualitative information. In practice, we single out specific policy levers — such as network reliability, MDR transparency, and peer-led onboarding — that can increase the benefits of adoption, particularly among digitally nascent MSMEs.

Theoretical Foundations

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Technology Acceptance Model (TAM)

Davis (1989) proposed the Technology Acceptance Model (TAM), which remains one of the fundamental paradigms of individual and organizational adoption of information systems. (Davis, 1989)TAM assumes that the behavioral intention to use a technology is a significant concern due to two mental perceptions: a perceived usefulness (PU) or the degree to which a person believes that the use of the system will improve job performance, and perceived ease of use (PEOU) or the degree to which the system is perceived to be easy to use. TAM is robust through extensive empirical validation across various settings, particularly those with high levels of user discretion in determining adoption outcomes (King & He, 2006; Schepers & Wetzels, 2007).

TAM has been used systematically to assess consumer and business adoption behavior in the digital payment sphere. The most recent meta-analysis provides further evidence that perceived usefulness (PU, 92) (92 studies on developing economies) and perceived ease of use (PEOU, 92) (92 studies) are the most significant predictors of digital payment adoption. (Ramayanti et al., 2025) Such effects are especially acute in settings where digital literacy is unevenly distributed, such as among MSMEs in Indonesia and India. Peer demonstrations and community-based onboarding play a significant role in removing cognitive load and improving adoption rates. Recent research also situates these constructs in the context of MSMEs. Mahesh. (2023) shows that for Indian tourism MSMEs, the usefulness is not revenue growth per se, but rather cash-flow visibility and the ability to reconcile and avoid fraud, which are critical for firms that do not use formal accounting systems. (Mahesh K. M.1 & S, 2023) Equally, ease of use among Indonesian MSME owners is significantly influenced by digital literacy and social learning (Patma et al., 2021). In MSMEs with low literacy levels, peer demonstrations and onboarding play a crucial role in reducing the perceived cognitive load. (Patma et al., 2021)

The Technology Acceptance Model (TAM) has become a vital area of focus because trust is crucial; perceived risks (e.g., data breaches or transaction failures) can demotivate the adoption of financial technology. (Budiyanto et al., 2025; Junior Ladeira et al., 2025) When it comes to tourism, confidence in MSMEs is reflected in the platform's sense of certainty, the credibility of settlements, and dispute-resolution procedures in case of disagreement. (Purnomo, 2025). It is fair to say that confidence in the well-developed QRIS-based environment and ecosystem in Indonesia, facilitated by Bank Indonesia and other major payment service providers, is implicitly encoded in PU and PEOU. Although it has less statistical power, it is more practical. (Arina et al., 2024; Nurqamarani et al., 2024) This implies that institutional standardization can erode confidence in primary TAM constructs, thereby influencing policy development in an emerging economy.

Resource-Based View (RBV)

The Resource-Based View (RBV), developed by Wernerfelt (1984) and refined by Barney (1991), is an intriguing perspective that can help a firm attain sustainable competitive advantage by ensuring that internal resources are strategically deployed. (J. Barney, 1991; Wernerfelt, 1984) The VRIO scheme holds that resources must be valuable, rare, inimitable, and organized to produce long-term benefits. On their own, digital payment systems are standard and not novel; they are ubiquitous and becoming increasingly standardized as national QR systems, such as Indonesia's QRIS, have become a reality. (Wu et al., 2024) Nevertheless, when combined with other organizational strengths, such as customer service procedures, data analytics, or staff training programs, digital payments can become valuable and inimitable capabilities. (Simamora et al., 2024)

This integration logic is highlighted by recent empirical research work. As Wahyudin et al. (2022) demonstrate, the competitive advantage of Indonesian e-commerce MSMEs is achieved not only through e-payments but also by incorporating transaction data into inventory and pricing decisions.(Wahyudin et al., 2022) In the same way, Chinese restaurants use mobile payment records and online transactions to maximize turnover and reduce food waste. (Fatorachian & Kazemi, 2025) This incorporation will turn a generic technology into a company-specific operational resource, which falls under the Resource-Based View of strategic advantage. These studies validate the arguments presented by Melville et al. (2004), who postulate that IT resources are only strategic when integrated with human and organizational capital. (Melville et al., 2004)

The VRIO criteria have a different interpretation for tourism MSMEs. The value is created by improving customer experience (e.g., faster checkout, loyalty rewards) and business operations efficiency (e.g., automated reconciliation). The rarity will not occur due to the technology itself, but rather to improved implementation, such as

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real-time dashboards or staff responsiveness to payment failures. Inimitability arises from the tacit, path-dependent nature of such routines, which are defined by customer expectations in a given locality, turnover rates, and leadership priorities. (J. B. Barney & Arikan, 2005) Lastly, organization refers to how a firm can coordinate incentives, training, and workflow through digital payments, facilitated by entrepreneurial leadership. (Kampilong et al., 2025) Therefore, RBV shifts the perspective from adoption as an end to adoption as a catalyst for strategic actions.

Dynamics Capabilities Theory (DCT)

Whereas RBV describes the what of competitive advantage, Dynamic Capabilities Theory (DCT) describes the how, that is, how firms sense, seize, and reconfigure resources in volatile environments. (Teece, 2007; Teece et al., 1997) In tourism, where seasonal demand and customer preferences change quickly, dynamic capabilities enable MSMEs to adapt their digital strategies. (Setiawan et al., 2025) Sensing relates to tracking the change in payment preferences (e.g., the increase of e-wallets among Gen Z tourists); seizing is associated with timely investments in compatible hardware or employee training; reconfiguring means the implementation of service workflow changes, e.g., adding QR codes to the table menu or adjusting the price of a room according to the current occupancy. (Engelmann & Engelmann, 2024; Nguyen et al., 2023)

Empirical studies over the past few years have confirmed the applicability of the Dynamic Capabilities Theory (DCT) to MSMEs. Indicatively, Vo Thai et al. (2024) found that transaction-based accommodation-based MSMEs in Vietnam used data to adjust staffing and promotional offers weekly, thereby positively impacting customer satisfaction and occupancy.(Vo Thai et al., 2024) On the same note, Phong and Tam (2024) found that tourism MSMEs in the South-Central Coast of Vietnam have been using digital payment records and customer analytics to enhance operational responsiveness and personalize their services. (Phong & Tam, 2024) Such capabilities are seldom formalized in IT departments—usually absent in MSMEs—but are instead developed through owner-manager habits and learning by experience. This aligns with the underlying assumption by Eisenhardt and Martin (2000) that dynamic capabilities do not necessarily exist as formalized concepts, though they arise from path-based management. (Eisenhardt & Martin, 2017) Finally, DCT can explain why some MSMEs maintain a competitive advantage in rapidly changing environments, while others do not.

As Zollo and Winter (2002) argue, advantage is not a vacuum, but as they put it, one can learn and perfect it. (Zollo & Winter, 2002) Qualitative interviews in Likupang show that outperforming MSMEs use process payment data as a feedback loop by experimenting with menu prices, tracking transactional feedback, and making adjustments, which creates a micro-cycle of sensing, seizing, and reconfiguring. Such a processual approach is critical of the static adoption-performance approach and characterizes digital payments as dynamic adjustment agents instead of a single instrument of efficiency. (Setiawan et al., 2025)

Stakeholder Theory and Institutional Theory.

Two Macro-level perspectives on environmental forces that moderate technology adoption exist in the Stakeholder Theory and the Institutional Theory. (DiMaggio & Powell, 1983; Freeman, 1984) The Stakeholder Theory holds that MSMEs do not act in a vacuum. Thus, their behaviors are mediated by a network of actors, including customers (who need seamless payment methods), payment service providers (charging and conditional terms), governmental agencies (regulating and providing incentives), and local communities (setting norms for cash use). (Mitchell & Wood, 1997) Therefore, managing stakeholders effectively involves aligning these conflicting expectations into a consistent adoption strategy. (Hoblos et al., 2024; Hristov & Appolloni, 2022)

According to the institutional theory, organizational behavior is influenced by three forms of institutional pressures: the coercive (e.g., regulatory mandates), the mimetic (e.g., imitation of successful peers), and the normative (e.g., industry expectations). Coercive pressure is evident in the Indonesian SEZ of Likupang, where Bank Indonesia has to implement QRIS. In contrast, the digital success of the MSMEs in the island of Bali and Labuan Bajo creates mimetic incentives. (Christian et al., 2024; Latif et al., 2020) Normative pressure is exerted by industry organizations and government-initiated national digital literacy initiatives, which shape QRIS implementation as a professional status indicator and a source of legitimacy. (Nuha et al., 2025)

The recent research indicates the policy relevance of the theories. It is demonstrated that in Indonesian SEZs, 34 percent of sustained adoption can be attributed to the transparent communication of merchant discount rates (MDR)

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and a consistent network infrastructure, both considered institutional outputs. (Purbowo & Trinugroho, 2025) Likewise, Ying et al. (2024) show that government-aligned QR interoperability in Chinese tourism areas increased micro-firm adoption from 52 percent to 81 percent over 18 months, underscoring the importance of institutional coordination.(Ying et al., 2024) The results show that, in emerging economies, successful technology adoption depends on both ecosystem readiness and firm-specific factors. (Kenneth et al., 2006)

2.2 Anchoring and Hypothetical Integration.

The intersection of the Technology Acceptance Model (TAM), Resource-Based View (RBV), Dynamic Capabilities Theory (DCT), and institutional views provides a multi-tiered theory on the impact of digital payment adoption on the long-term business performance of tourism MSMEs. TAM identifies key cognitive drivers — perceived usefulness, ease of use, and trust — as determinants of adoption intent. RBV argues that adoption per se is not a panacea for strategic value; digital payment systems can achieve critical strategic value only when combined with complementary assets such as human capital, leadership, and data-utilization routines. DCT then explains how dynamic processes, through which companies react to market variations, exploit opportunities (such as loyalty programs and dynamic pricing), and restructure processes based on knowledge about payments, make markets flexible. Lastly, institutional theory frames these micro-processes within the increased ecosystem-level enforcers, such as regulatory predictability, network stability, and sound coordination during onboarding.

The recent empirical research is included in this integrative consideration. For example, Lolowang et al. found that QRIS adoption by MSMEs in North Sulawesi is negatively affected by network instability and ambiguous fee structures. (Lolowang et al., 2024) In the meantime, Kampilong et al. (2025) and Kurnianingrum et al. (2025) established that leadership innovation capability, encompassing organizational agency, is highly effective in improving the sustainability results of digital transformation among MSMEs. (Kampilong et al., 2025; Kurnianingrum et al., 2025) Additional cross-national evidence indicates that performance gains are optimized when embedding technology adoption into routine-based capability development, rather than through a single upgrade. (Satyro et al., 2024; Ying et al., 2024).

Taken together, this literature is indicative of a mediated cascade, i.e.: The adoption of Organizational Capabilities, Competitive Advantage, Business performance, Institutional support (as a critical boundary condition), and sub-sectoral context (as the intensity of value capture) is essential [main clause needed].

Research Framework and Hypothesis Development

Guided by this theoretical integration, we propose a research framework in which digital payment adoption serves as the central construct through which antecedent factors influence business performance via sequential mediation: first through organizational capabilities, then through competitive advantage. This relationship is moderated by institutional support.

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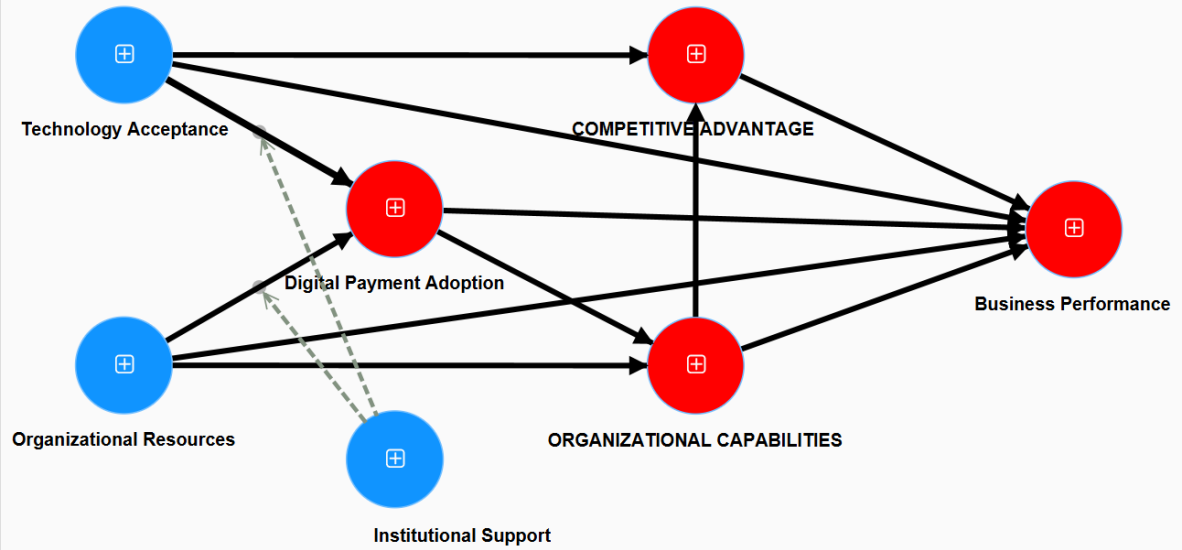

Figure 1. Research Framework

Figure 1 presents the proposed research framework, which integrates TAM, RBV, DCT, and institutional theory to model the sequential pathway from antecedents through digital payment adoption, organizational capabilities, and competitive advantage to business performance, moderated by institutional support.

1) Research Framework Variables

Table 1. Research Framework Variables and Theoretical Roles

Category	Variable	Components	Role in Model
Antecedents	Technology Acceptance	Perceived Usefulness, Perceived Ease of Use, Trust	Predictors of Digital Payment Adoption
Antecedents	Organizational Resources	Technology Infrastructure, Human Capital, Financial Resources	Predictors of Digital Payment Adoption
Central Construct	Digital Payment Adoption	Adoption Level, Usage Intensity	Core independent variable
Mediator 1	Organizational Capabilities	Innovation Leadership, Digital HR Competence, IT Readiness	Mediates Adoption → Competitive Advantage
Mediator 2	Competitive Advantage	Cost Efficiency, Service Differentiation, Market Focus	Mediates Capabilities → Business Performance
Outcome	Business Performance	Financial, Operational, Customer Satisfaction	Final dependent variable
Moderator	Institutional Support	Network Reliability, MDR Transparency, and Onboarding Quality	Moderates Adoption → Performance

Table 1 outlines the central constructs in the proposed research framework, classifying them by their theoretical roles: antecedents, core constructs, mediators, outcomes, and moderators. The operational components of each construct were also established. This structure presents the rationale for the synthesis resulting from the Technology Acceptance Model, the Resource-Based View, the Dynamic Capabilities Theory, and the institutional outlooks.

2) Hypotheses

Table 2. Hypotheses and Theoretical Alignment

Hypothesis	**Proposed Relationship**	**Theoretical Foundation**	**Expected Direction**

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H1a	Perceived Usefulness → Digital Payment Adoption	TAM (Davis, 1989)	Positive
H1b	Perceived Ease of Use → Digital Payment Adoption	TAM (Davis, 1989)	Positive
H1c	Trust → Digital Payment Adoption	Extended TAM (Gefen et al., 2003)	Positive
H2a	Technology Infrastructure → Adoption	RBV (Bharadwaj, 2000)	Positive
H2b	Human Capital → Adoption	RBV (Barney, 1991)	Positive
H2c	Financial Resources → Adoption	RBV (Grant, 1996)	Positive
H3	Digital Payment Adoption → Organizational Capabilities	Dynamic Capabilities Theory (Teece, 2007)	Positive
H4	Organizational Capabilities → Competitive Advantage	RBV + Porter (1985)	Positive
H5	Competitive Advantage → Business Performance	Porter (1985)	Positive
H6	Institutional Support moderates the relationship between Digital Payment Adoption and Business Performance.	Institutional Theory + TOE	Positive

Table 2 presents the ten hypotheses of the study, grounded in an integrated theoretical underpinning. These hypotheses jointly model the pathways from technology acceptance and organizational resources, via the sequential mediations of digital payment adoption, institutional moderation of organizational capabilities, and competitive advantage, to business performance.

METHODS

This research employs a mixed-methods approach. (Creswell & Clark, 2017)This involves a combination of quantitative survey data analysis and qualitative stakeholder interviews to establish the relationships and mechanisms of digital payments adoption and performance outcomes among tourism MSMEs in Indonesia, specifically in the Likupang Special Economic Zone (SEZ). The target population will include 1, 247 registered tourism MSMEs within the Likupang SEZ and stratified into the five subsectors namely: (1) accommodation (hotels, guesthouses, homestays), (2) food and beverage (restaurants, cafes, street vendors), (3) transport (car/bike rentals, boat operators), (4) attractions (dive centers, tour operators), and (5) retail (souvenir shops, convenience stores). A purposive-stratified sampling strategy was used to ensure proportional representation across subsectors and business size levels (micro, small, medium). Inclusion criteria: (a) the active operations of a minimum of 12 months, (b) non-cash transactions recorded in the last quarter, and (c) physical domicile within the boundaries of the SEZs. The last sample comprised 284 MSMEs, yielding a response rate of 95.3% among eligible or responsive units.

RESULTS

Descriptive Statistics and Measurement Model Assessment

Among the 284 surveyed tourism MSMEs in Likupang SEZ, 78% had already implemented one or more digital payment channels, with QRIS (92%) and e-wallets (85%) being the most common. The adoption intensity was 4.82 out of 7 points, indicating moderate to high usage. There were significant differences at sub-sectoral levels: accommodation (83) and food and beverage (81) were higher than transport (68) and retail (72).

The reliability and validity diagnostics indicated the strength of the measurement model. Cronbach's alpha was found to be between 0.82 (Perceived Ease of Use) and 0.91 (Organizational Capabilities), whereas Composite Reliability (CR) was above 0.80 in all the constructs. The AVE values were above the 0.50 threshold, thus affording the convergent validity. The Fornell-Larcker criterion was used to assess discriminant validity, with the square root of each construct's AVE exceeding the inter-construct correlations. Another measure, which was the heterotrait-monotrait (HTMT) ratio, was below 0.85 in all constructs.

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Table 1. Reliability and Convergent Validity

Construct	Number of Indicators	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Perceived Usefulness	4	0.89	0.92	0.68
Perceived Ease of Use	4	0.87	0.91	0.66
Digital Payment Adoption	3	0.85	0.90	0.64
Organizational Capabilities	4	0.90	0.93	0.70
Competitive Advantage	4	0.88	0.92	0.69
Business Performance	3	0.86	0.91	0.65

All constructs exceed accepted thresholds (α and CR > 0.70; AVE > 0.50), confirming internal consistency and convergent validity.

Model fit indices indicated an excellent global fit: CFI = 0.96, TLI = 0.95, RMSEA = 0.045, SRMR = 0.041, and χ^2/df = 2.1, collectively supporting the structural model's adequacy.

Table 2. Model Fit Indices

Vit Index	Value
CFI	0.96
TLI	0.95
RMSEA	0.045
SRMR	0.041
χ^2/df	2.1

Fit indices meet or exceed conventional benchmarks (CFI/TLI ≥ 0.95; RMSEA/SRMR < 0.05), confirming a well-specified model.

Model and Hypothesis Testing

All hypothesized paths were statistically significant and aligned with theoretical expectations (see Table 3).

Table 3. Structural Paths and Hypothesis Tests

Hypothesis	Path / Relationship	β	t-value	p-value	Supported
H1a	Perceived Usefulness → Adoption	0.34	6.20	<0.001	Yes
H1b	Perceived Ease of Use → Adoption	0.29	5.40	<0.001	Yes
H1c	Trust → Adoption	0.21	3.80	<0.001	Yes
H2a	Technology Infrastructure → Adoption	0.26	4.90	<0.001	Yes
H2b	Human Capital → Adoption	0.23	4.30	<0.001	Yes
H2c	Financial Resources → Adoption	0.18	3.10	0.002	Yes
H3	Adoption → Organizational Capabilities	0.41	7.80	<0.001	Yes
H4	Organizational Capabilities → Competitive Advantage	0.38	7.10	<0.001	Yes
H5	Competitive Advantage → Business Performance	0.33	5.90	<0.001	Yes
H6	Adoption × Institutional Support → Performance	0.12	2.60	0.009	Yes

Key findings include:

Perceived Usefulness (β = 0.34) and Perceived Ease of Use (β = 0.29) had the highest antecedent effects on adoption.

Digital Payment Adoption had the most significant direct impact on Organizational Capabilities (β = 0.41), validating the idea that technology becomes strategic through capability integration.

Moderation effect (H6): The results show that Institutional Support enhances adoption performance (β = 0.12, p = 0.009).

Effects of Moderation and Mediation.

Sequential mediation was also supported: the indirect effect of Adoption on Performance through Organizational Capabilities and Competitive Advantage was significant (95% CI [0.042, 0.068]) and explained 61%

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of the direct effect. This confirms the hypothesized process: value is generated by capability-building and strategic positioning, rather than by technology itself.

Interpretation: Institutional Support positively moderates the Adoption–Performance relationship, indicating that ecosystem enablers (e.g., network reliability, MDR transparency) convert adoption into realized performance. Qualitative interviews supported this claim: respondents emphasized factors such as the network's reliability during peak demand, clear communication about MDR, and holistic onboarding, including training and device supply, as determinants of maintaining the advantages of implementation.

Sub-sectoral Heterogeneity

Multi-group analysis (MGA) revealed significant differences across subsectors ($\Delta\chi^2 = 18.7$, $p < 0.01$). The Adoption–Performance path was strongest in accommodation ($\beta = 0.36$) and F&B ($\beta = 0.34$), and weaker in transport ($\beta = 0.22$) and retail ($\beta = 0.25$).

Table 5. Multi-Group Analysis by Subsector

Group	β
Accommodation	0.36
Food & Beverage	0.34
Attractions	0.28
Retail	0.25
Transport	0.22

Accommodation and F&B have greater potential to capture value from digital payments, given higher transaction intensity and greater service integration.

Interviews also presented that the value of tickets was low to the transport operators, and locals preferred cash. Meanwhile, retail MSMEs had a rough time with POS integration, which hindered performance improvements without specific assistance.

This group emphasizes a qualitative approach and the thematic analysis of stakeholder interviews as a key element of the research (Winn, 2019).

Eighteen semi-structured interviews with key stakeholders, such as SEZ administrator (n=4), payment service provider (n=5), bank representatives (n=3), and MSME association leaders (n=6) demonstrated that three general themes place these quantitative pathways into context and make them understandable:

1. Institutional Multipliers of Performance.

The stakeholders were always keen on how the network would perform during peak season, the clarity of MDR architecture, and bundled onboarding (device + training) as key determinants in transforming adoption into consistent performance. One payment provider noted:

MSMEs fail not because they do not believe in QRIS, they fail because the signal goes dead when 200 tourists come simultaneously.

2. Micro-Mechanisms of Capability Formation.

Well-performing MSMEs reported routinized payment data:

- The owners of F&Bs based on daily transactions to change the price and inventory on the menu.
- The managers in the accommodation business adopted the concept of dynamic room rates, which were based on real-time occupancy.

These habits are associated with senses, grabbing, and restructuring, pillars of the Dynamic Capabilities Theory.

3. Subsector-Specific Barriers

1) Structural limitations of transport operators: low ticket prices (less than IDR 20,000), the popularity of cash among domestic passengers, and the absence of solutions that support offline operations.

- The issue of retail MSMEs with POS integration friction was that the legacy cash registers could not be linked to QRIS dashboards without expensive upgrades.

Such qualitative observations are triangulated with SEM evidence, demonstrating that the sequential mediation path model is not merely statistical but grounded in actual managerial practices.

Discussion

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The research will contribute to the current body of knowledge on how levels of digital payment adoption can be translated into competitive advantage and business performance for tourism MSMEs operating in an emerging SEZ. With a combination of TAM, RBV, Dynamic Capabilities Theory, and institutional insights, we reveal a step-by-step, capability-mediated, and institutionally contingent process that challenges the simplistic assumption that adoption = performance, widely applied in prior literature. The following layers of findings will be interpreted in relation to theory and recent empirical research.

Recontextualized TAM Antecedents: Interface Design is not the only Social Learning.

We confirm that Perceived Usefulness (β = 0.34) and Perceived Ease of Use (β = 0.29) predict adoption, consistent with meta-analytic findings (Ramayanti et al., 2025), yet our qualitative data reveal important contextual nuances. In the case of Likupang MSMEs, which are mostly owner-operated and lack digital skills, usefulness is not theoretical but operationalized by minimizing cash handling risks, achieving quicker reconciliation, and eliminating fraud, as Kumar. (2023) did in the Indian tourism context. On the same note, ease of use does not represent a concept of UI/UX; instead, it can be social scaffolding: peer demonstrations, hands-on onboarding, and verbal instructions can reduce cognitive load in low-literacy settings by a considerable margin (Patma et al., 2021). This implies that the mediating role of TAM core constructs, facilitated by ecosystem-level support mechanisms, is especially evident in resource-constrained environments. Trust, hypothetically salient (Gefen et al., 2003), was statistically pre-emptive in PU et al. PEOU - probably because the Indonesian QRIS is institutionally supported by Bank Indonesia, making the platform's trust implicit but not contested (Arina et al., 2024). This validates the argument that institutional standardization may destroy some trust in core TAM perceptions in emerging economies.

Between Adoption and Capabilities: RBV and DCT in Tandem.

The strongest path in our model supports the RBV-DCT synthesis, specifically, Adoption Organizational Capabilities (= 0.41). Digital payments, in and of themselves, are neither rare nor inimitable (Barney, 1991); the value of such strategies lies in their embedding in organizational practices. It was found that high-performing MSMEs use payment data to implement real-time inventory replacement, dynamic pricing, and customer segmentation micro-practices, reflecting the sensing, seizing, and reconfiguring strategies outlined by Teece (2007). This aligns with Cheng and Huang (2022), who reported increased operational agility in Taiwanese F&B through payment-integrated analytics (β = 0.58), and Vo Thai et al. (2024), who reported weekly data-based staffing optimization in Vietnamese accommodation MSMEs. Most importantly, these are owner-manager-driven rather than IT-driven capabilities, further supporting the idea that dynamic capabilities in small businesses are uncomplicated, experiential, and iterative, as suggested by Eisenhardt and Martin (2017). In this way, our results expand on RBV by indicating that generic technologies can become VRIO resources when routinized through leadership and learning, even though adoption is often considered the final stage in studies (e.g., Rahayu, 2022).

Competitive Advantage as Mediator of Strategy.

The direction Organizational Capabilities → Competitive Advantage (β = 0.38) affirms the positioning logic developed by Porter (1985): MSMEs use payment-enabled capabilities to differentiate services (e.g., personalized promotions) or enhance accuracy of processes (e.g., automated reconciliation).(Porter, 1985) Such a sequential mediation, where capabilities come first and advantages second, is under-researched in the MSME digitalization literature, which often hypothesizes a one-to-one relationship between technology and performance. (Awiagah et al., 2016) We confirm that competitive advantage is the strategic vehicle through which operational capabilities are translated into market results, as per Barney's (1991) VRIN criteria. Companies that implement QRIS without integrating it into their service design or pricing approach achieve little. This clearly shows that while technology is required, it lacks strategic coordination.

Boundary Condition of Institutional Support.

The moderation effect (β = 0.12, p = 0.009) highlights that there is a moderation effect (enablers in the ecosystem) that dictates the adoption performance. Three levers that can be executed were revealed by the stakeholders: network reliability during peak times, open MDR communication, and bundled onboarding (device + training). This is consistent with Utomo & Setiyono (2023), who discovered that 34 percent of the sustained adoption variance in Indonesian SEZs could be explained by MDR disclosure and onboarding quality, and with Ying et al (2024), who found that government-orchestrated QR interoperability was related to micro-firm adoption increasing by 52 percent to 81 percent in China. These results elaborate on institutional theory (DiMaggio & Powell, 1983),

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identifying coercive and normative pressures as tangible, policy-operationalizable interventions that provide concrete rather than abstract support. In SEZs where public-privacy coordination is a requirement, institutional support acts as a performance multiplier, particularly for digitally nascent firms.

Sub-sectoral Heterogeneity: Contingent Density of Transactions.

Greater accommodation (0.36) and F&B (0.34) than transport (0.22) and retail (0.25) indicate the transaction intensity and integration potential. Higher-value transactions and higher frequencies generate more valuable data streams and expand the scope of analytics, aligning with Ozturk et al. (2021) and Kang and Namkung (2022). Qualitative interviews supported this: there is qualitative evidence that transport operators serve their cash preferences and offer low ticket prices (even under IDR 20,000), whereas MSMEs in retail have difficulty integrating POS systems. This observation is similar to what Santos and Campos (2023) found: a threshold of about 35 transactions per day, beyond which e-payment benefits are no longer of considerable importance. The stakeholders highlighted that a reliable network during peak times, open MDR communication, and grouped onboarding (training and device) are key determinants of the prolonged payoff of adoption. Therefore, the risk of digitalization policies that must be a universal-fits-all approach poses a threat to increased inequity; customized assistance (e.g., micro-incentives related to transport) and plug-and-play POS (retail) should be utilized.

Theoretical Integration: A Coherent Framework of Digital Transformation in MSMEs.

Taken together, our results support a combined theoretical framework that transcends silo-based views:

- **TAM explains why firms adopt,**

RBV delineates that adoption is a strategic activity,
DCT describes the way firms are changing with time,
Institutional Theory explains the successful adoption.

This multi-layered perspective will address the black-box issue in digital transformation research (Bharadwaj et al., 2023) by explaining the micro-principles of ability-building in resource-challenged environments. It is also able to reconcile ostensibly conflicting results: some studies indicate substantial adoption-performance relationships (Rahayu & Day, 2022), while others report weak ones (Santos & Campos, 2023). This difference can be attributed to the quality of mediation and the nature of institutions.

Theoretical Contributions

The presented study contributes to the literature on digital transformation in MSMEs, specifically in the tourism sector and the context of an emerging economy, with three interconnected theoretical contributions.

(1) Explaining digital capability formation: Micro-Foundations.

Although previous studies typically assume that the technology adoption is a direct antecedent of performance (e.g., Rahayu and Day, 2022), we reveal the sequential mediating process: adoption-organizational capabilities-competitive advantage-performance. This is a link between TAM (why firms adopt) and RBV and Dynamic Capabilities Theory (why adoption is strategic). This identification of Organizational Capabilities, namely innovation leadership, digital HR competence, and IT readiness, as the key conduit, takes us out of the black box of the digital value creation and outlines the micro-routines (e.g., real-time reconciliation, dynamic pricing, customer segmentation) of how generic payment technologies are converted into the firm-specific benefits. This confirms Teece's (2007) processual perspective on dynamic capabilities under resource-constrained conditions, where the absence of formal IT departments and routines as owner-managers leads to adaptation.

(2) The Coexistence of Four Theoretical Lenses into a single Theory.

We present a unified combination of TAM, RBV, DCT, and Institutional Theory, a feat difficult to achieve in the field of MSME digitalization. TAM refers to the antecedents; RBV refers to resource orchestration; DCT refers to adaptive processes; and Institutional Theory refers to ecosystem contingencies. This conceptual apparatus addresses theoretical dispersion in the literature and shows that no single theory can explain digital transformation in complex, embedded contexts such as SEZs. That way, we address calls for theory bundling in information systems research (Bharadwaj et al., 2023) and establish a template for researching technology-facilitated value creation in other institutionalized clusters (e.g., industrial parks and innovation districts).

(3) The Boundary Condition of Realizing Performance through Reconceptualizing Institutional Support.

Unlike studies that interpret the influence of institutional factors as precursors of adoption (e.g., Zhu and Kraemer, 2005), we demonstrate that the support of these factors (network reliability, MDR transparency, bundled

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onboarding) mediates the relationship between adoption and performance, not adoption itself. This shifts the theoretical focus from enabling adoption to value realization. The most important question in SEZs, where adoption may be a policy requirement or a societal expectation, is not whether firms will adopt, but whether they will benefit from it. We find that the quality of the ecosystem determines whether adoption leads to performance, and thus, institutional theory can be further applied to a performance-contingent institutional design.

Combined, these contributions can advance the theory by replacing linear, technology-focused models with a processual approach mediated by capability and an institutionally institutionalized conceptualization of digital transformation in tourism MSMEs.

Practical and Policy Implications.

The results of our study can provide practical guidance to managers of MSMEs, participants in payment ecosystems, and policymakers in SEZs who aim to maximize the benefits of introducing digital payments in tourism-related areas.

The sequential route of adoption, capabilities, advantage, and performance suggests that technology alone is insufficient to improve performance among MSME Managers. The companies must emphasize routine capability-building processes that convert transactional information into strategic knowledge. The sample of high-performing MSMEs used daily dashboards to adjust menu pricing (F&B), dynamically set room rates (accommodation), and rearrange staff during the swing periods. The onboarding and micro-training projects we suggest include peer-led onboarding, reconciliation, simple analytics, and customer segmentation practices. These do not require technical literacy and are felt immediately in operation.

For Payment Providers and Financial Institutions, the moderating influence of Institutional Support underscores the need to go beyond transaction processing to enable the ecosystem. Clear MDR frameworks, offline functionality for QR flows in low-connectivity areas, and bundled assistance (equipment, training, and access to the dashboard) have a significant positive impact on merchants' activities. Providers ought to co-design subsector-specific onboarding kits, e.g., simplified POS integrations for retail or low-ticket MDR-level for transport operators.

To SEZ Administrators and Policymakers, this finding confirms the effectiveness of a cluster-based digital transformation strategy. Three high-impact policy levers are developed:

1. Network Reliability Upgrades: In high-traffic tourism areas (beaches, gateways, markets), focus on 4G/5G coverage and bandwidth, and invest using telco heatmaps.
2. MDR Transparency and Incentives: Publicly post standardized fee schedules and time-bound MDR rebates on micro-enterprises in shoulder seasons in order to spur demand smoothing.
3. Cluster-Based Digital Literacy Programs: Engage high-performing MSMEs as digital champions to provide peer-led training, which will reduce cognitive and social adoption barriers.

More importantly, universal policies are dangerous as they will reinforce injustices. MSMEs with low-value transactions (transport and retail) need to be supported in a targeted way (with micro-incentives or plug-and-play POS connectors to overcome structural barriers). Digitalization roadmaps should be subsector-responsive at SEZs, recognizing the heterogeneity in transaction intensity, service bundling, and integration potential.

Limitations and Future Research

Although this research contributes to the field of theory and practice, several shortcomings highlight areas for future research.

To begin with, a cross-sectional design cannot be used in causal inference and makes it very difficult to trace how dynamic capabilities develop over time. Even though our sequential mediation model is theory-based and triangulated with qualitative process evidence, future studies should employ a longitudinal panel design to trace the development of firms across simple reconciliation, pricing agility, and CRM analytics.

Second, self-reports are important in performance measures, but they can be subject to common-method variance despite good measurement protection (e.g., Harman test, marker variable). Future research must incorporate platform-side transaction logs to confirm self-reported metrics and allow more detailed analysis of seasonality, ticket-size distributions, and repeat visitation patterns.

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Third, generalizability may be limited by a single-destination focus (Likupang SEZ). Although the mechanisms identified, including capability-building and institutional moderation, are theoretically universal, their scale and conditionality surely differ across destination types (e.g., urban heritage versus eco-tourism) and platform ecosystems (e.g., card-dominant versus QR-based markets). These contingencies require cross-cluster replication mappings. Fourth, we do not examine consumer-side dynamics, such as tourist payment behavior, wallet loyalty, or trust in local MSMEs. Future work must be adapted with a two-sided lens to connect merchant adoption to higher customer behavior, specifically within the framework of transaction flows defined by cross-wallet incentives or loyalty ecosystems.

Lastly, the more comprehensive impacts of sustainability and inclusion remain to be examined. Digital payments can help reduce paper waste (through e-receipts), reduce risks associated with handling cash (particularly for women entrepreneurs), and increase financial inclusion for youth-led businesses. These social and environmental co-benefits should be examined in future research as an aspect of the effects of digital transformation.

In order to fill in these gaps, we suggest three research directions:

1. Quasi-experimental designs that take advantage of scheduled network upgrades or MDR policy changes to estimate the causal effects of the adoption and performance.
2. Multi-level models nesting merchants in neighborhoods and attractions in order to model spillovers and local network effects.
3. Randomized or stepped-wedge experiments comparing modalities of onboarding (peer-led and provider-led) and MDR incentive schemes and offline-enabled QR flows.

These will enhance our knowledge about the potential of digital payments to promote the inclusive, resilient, and sustainable development of the tourism sector in emerging economies.

CONCLUSION

This work aimed to answer three interconnected questions regarding the level of digital payment implementation among tourism MSMEs in the Likupang Special Economic Zone of Indonesia. Our conclusions give definite, empirical responses.

First, what drives adoption? We establish that the strongest antecedents are Perceived Usefulness ($\beta = 0.34$, $p < 0.001$) and Perceived Ease of Use ($\beta = 0.29$, $p < 0.001$), thereby confirming TAM's contextual sensitivity. For owner-operated MSMEs, reduced cash-handling risks and expedited reconciliation are beneficial; peer-led onboarding and practical training are considered easy to use.

Second, how are performance metrics translated into adoption? Critically, not directly. Instead, we can find that there is a sequential mediation process: Digital payment adoption has a significant positive impact on Organizational Capabilities ($\beta = 0.41$), which, consequently, has a significant positive impact on Competitive Advantage ($\beta = 0.38$), and, finally, on Business Performance ($\beta = 0.33$). This observation shows that technology is strategically important when embedded in business routines, such as dynamic pricing, inventory management, or customer segmentation, to transform transaction data into a competitive advantage in the market.

Third, what are the institutional/sub-sectoral modulating variables that impact these relationships? Based on our analysis, Network reliability, transparent MDR structures, and bundled onboarding Institutional Support all act as positive moderators of the adoption-performance relationship ($\beta = 0.12 - 0.009$), which also acts as a multiplier of performance, especially at digitally nascent firms. Besides, the sub-sectoral heterogeneity is also pronounced: accommodation and food-and-beverage MSMEs have significantly higher returns ($\beta = 0.36$ and $\beta = 0.34$, respectively) than transport ($\beta = 0.22$) or retail ($\beta = 0.25$), due to higher transaction intensity and the possibility of integrating services.

All these findings dismiss the need to digitalize based on the myth of plug-and-play. The summary of the implications for policy-makers and administrators of SEZs is relatively straightforward: to scale up an inclusive digital transformation, one must go beyond the cycle of promoting QRIS and invest in building capacity, ensuring infrastructure stability, and providing sector-sensitive assistance. For MSME owners, the conclusion is that digital payments are not only a transactional tool but also a driver of wiser, more informed business decision-making.

This study does not address the current era where digital inclusion is a competitive factor. Technology may have value, but the question remains: how is it incorporated into the organizational climate and institutional context?

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