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Research Article

Digital Transformation as a Reinforcement of Competitive Advantage and Resilience of Highland Tourism Villages in Central Java

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Abstract: This study aims to analyze the role of digital transformation in strengthening competitive advantage and resilience of highland tourism villages in Central Java. Highland tourism villages face increasing competition, environmental vulnerability, and market uncertainty, requiring adaptive and innovation-driven strategies. Digital transformation is considered a strategic instrument to enhance destination competitiveness, expand market access, and improve institutional resilience. This research employs a quantitative approach using Structural Equation Modeling (SEM-PLS) to examine the relationships among digital transformation, competitive advantage, and tourism village resilience. The study was conducted in selected highland tourism villages in Central Java, including [insert village names if needed]. Data were collected through structured questionnaires distributed to tourism village managers, local stakeholders, and community representatives. The findings indicate that digital transformation has a significant positive effect on competitive advantage and resilience. Furthermore, competitive advantage partially mediates the relationship between digital transformation and tourism village resilience. These results suggest that digital adoption, digital marketing integration, and digital governance practices are critical in strengthening sustainable tourism development in highland areas. The study contributes to the literature on digital tourism transformation and provides managerial implications for policymakers and tourism village managers in developing adaptive and resilient tourism ecosystems.

Keywords: Central Java; Competitive Advantage; Digital Transformation; Highland Tourism; Tourism Village Resilience.

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1. Introduction

Tourism has evolved into one of the most dynamic sectors of the global economy, contributing significantly to employment, income generation, and regional development. The World Tourism Organization emphasizes that sustainable tourism development must balance economic growth, social inclusion, and environmental preservation (1). In Indonesia, tourism villages have emerged as a strategic model to operationalize community-based tourism principles while strengthening rural economies.

Highland tourism villages in Central Java represent a distinctive tourism typology characterized by mountainous landscapes, unique microclimates, and strong local cultural identity. These attributes provide inherent differentiation advantages consistent with Porter's competitive positioning framework as articulated in *Competitive Advantage* (2). However, differentiation alone does not guarantee sustainability in a highly volatile tourism market.

From the perspective of the Resource-Based View developed by Jay Barney, sustained competitive advantage depends on valuable, rare, inimitable, and non-substitutable resources (3). Highland villages possess such resources in the form of landscape uniqueness, cultural authenticity, and community cohesion. Yet, without adaptive capabilities, these resources may lose relevance amid technological disruption and changing tourist behavior.

Digital technology has transformed tourism systems globally through online booking systems, digital marketing platforms, virtual experiences, and data-driven decision-making (4). Research published in *Tourism Management* demonstrates that digital integration enhances destination competitiveness by improving market reach and customer engagement.

The acceleration of digitalization has become even more critical in post-crisis contexts. Tourism resilience literature highlights the importance of adaptive capacity in managing shocks such as pandemics, environmental disasters, and economic downturns (5). According to David Teece, organizations must develop dynamic capabilities to sense opportunities, seize them, and reconfigure resources effectively in turbulent environments (6).

In rural tourism contexts, digital transformation not only expands market access but also strengthens community empowerment and institutional learning. Studies in *Journal of Sustainable Tourism* reveal that digitally enabled destinations demonstrate higher adaptability and innovation capacity.

Despite growing literature on smart tourism and digital destinations, limited empirical research integrates digital transformation with competitive advantage and village resilience within highland tourism settings in Indonesia. Existing Indonesian studies published in *Jurnal Kepariwisataan Indonesia* and *Jurnal Manajemen dan Kewirausahaan* tend to examine competitiveness or sustainability separately rather than through an integrated strategic lens.

This study addresses that gap by proposing a comprehensive model in which digital transformation functions as a strategic capability that strengthens both competitive advantage and village resilience, ultimately contributing to sustainable tourism development.

2. Literature review

Digital Transformation in Tourism

Digital transformation refers to the integration of advanced digital technologies into organizational processes, service delivery, and stakeholder interaction systems (7). In tourism, digitalization reshapes the value chain by enabling real-time communication, online booking systems, and data-driven personalization strategies.

The concept of smart tourism further emphasizes the role of big data, Internet of Things (IoT), and artificial intelligence in enhancing destination management and competitiveness (8). Empirical research indicates that digital integration improves customer engagement, operational efficiency, and strategic positioning of tourism destinations (9).

Moreover, digital platforms allow destinations to expand global visibility and build stronger online reputations through review systems and social media interaction (10). These digital assets increasingly function as strategic resources that contribute to long-term performance advantages.

However, rural and highland destinations often face digital infrastructure gaps and limited technological capabilities, which may hinder full digital transformation (11). Therefore, digital adoption must be accompanied by institutional learning and capacity development.

Competitive Advantage in Tourism Context

Competitive advantage in tourism is achieved when destinations are able to deliver superior value compared to competitors through differentiation, innovation, and efficient resource utilization (12). In rural tourism settings, competitive positioning often depends on uniqueness of natural landscapes and cultural authenticity.

The Resource-Based View (RBV) perspective suggests that sustainable competitive advantage arises from resources that are valuable, rare, inimitable, and non-substitutable (13). In highland tourism villages, such resources include endemic environmental characteristics, traditional knowledge, and strong community cohesion.

Nevertheless, in dynamic environments, static resources alone are insufficient. The Dynamic Capabilities framework argues that organizations must continuously reconfigure their resources to respond to environmental changes (14). Digital transformation may therefore function as a dynamic capability that enhances adaptability and competitive performance.

Tourism Resilience and Adaptive Capacity

Tourism resilience refers to the ability of destinations to anticipate, absorb, recover from, and adapt to external shocks (15). Resilience includes dimensions such as robustness, recovery speed, and transformative capacity.

Post-crisis tourism research demonstrates that destinations equipped with digital communication systems and online engagement strategies show faster recovery trajectories (16). Digital tools facilitate crisis communication, maintain destination visibility, and support alternative service delivery mechanisms during disruptions. In rural tourism contexts, digital transformation strengthens resilience by:

1. Diversifying marketing channels
2. Enhancing stakeholder coordination
3. Supporting innovation and collective learning

However, empirical integration of digital transformation, competitive advantage, and resilience in highland tourism villages remains limited, especially within the Indonesian context.

Tourism Resilience and Adaptive Capacity

While digital transformation, competitive advantage, and resilience have been studied extensively in tourism contexts, significant gaps remain:

1. **Lack of integrated empirical models** combining digital transformation, competitiveness, and resilience — especially in rural and highland settings.
2. **Limited research in Indonesian tourism villages**, most studies focus on individual aspects (competitiveness or sustainability) rather than strategy integration.
3. **Few quantitative studies** using robust models (e.g., SEM-PLS) to validate relationships among digital transformation, competitive advantage, and resilience.

Existing studies in *Jurnal Kepariwisataan Indonesia* and *Jurnal Manajemen dan Kewirausahaan* examine competitiveness or sustainability separately, without an integrated strategic lens that involves digital transformation as both a driver of competitive advantage and resilience.

Hypothesis

Digital Transformation and Competitive Advantage

Digital transformation enhances organizational capability by improving innovation processes, customer engagement, and operational efficiency (17). In tourism destinations, digital marketing, online booking systems, and integrated information platforms strengthen visibility and market positioning (18).

Empirical research shows that digital capability significantly contributes to destination competitiveness by expanding market reach and enhancing visitor experience (19). Therefore, digital transformation can function as a strategic enabler of competitive advantage in highland tourism villages.

H1: Digital transformation has a positive and significant effect on competitive advantage.

Digital Transformation and Tourism Village Resilience

Resilience in tourism refers to the ability of destinations to adapt and recover from external shocks (20). Digital technology supports resilience by maintaining communication channels, facilitating adaptive marketing strategies, and enabling institutional coordination during crises (21).

Studies during global disruptions demonstrate that digitally active destinations exhibit stronger adaptive capacity and faster recovery (22). In highland tourism villages, digital transformation may enhance flexibility and innovation capacity, strengthening overall resilience.

H2: Digital transformation has a positive and significant effect on tourism village resilience.

Competitive Advantage and Tourism Village Resilience

Competitive advantage provides destinations with stronger market positioning, financial stability, and stakeholder confidence (23). Strategic management literature suggests that organizations with sustained competitive advantage possess greater flexibility to respond to environmental turbulence (24).

In tourism villages, strong differentiation and brand identity contribute to stable visitor flows and institutional sustainability, which are key components of resilience.

H3: Competitive advantage has a positive and significant effect on tourism village resilience.

3. Proposed Method

Research Design

This study employs a quantitative research design using a survey-based approach to examine the relationships between digital transformation, competitive advantage, and tourism village resilience. The research model is tested using Partial Least Squares Structural Equation Modeling (PLS-SEM), which is appropriate for predictive research and complex causal modeling (27).

PLS-SEM is selected because it is suitable for exploratory and theory development studies, particularly when analyzing strategic capability constructs in tourism research (28).

Research Location and Population

The study focuses on highland tourism villages in Central Java, Indonesia. These villages represent mountainous tourism destinations characterized by natural landscape uniqueness, cultural authenticity, and community-based tourism governance.

The population consists of tourism village managers, local tourism entrepreneurs, village officials, and community members actively involved in tourism activities.

Sampling Technique

A purposive sampling technique is applied, targeting respondents who:

1. Are directly involved in tourism management
2. Have knowledge of digital practices within the village
3. Participate in strategic decision-making processes

The minimum sample size follows the ten-times rule in PLS-SEM methodology (29), ensuring statistical adequacy for structural model testing.

Measurement of Variables

All variables are measured using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Digital Transformation

Digital transformation is conceptualized as the extent to which tourism villages adopt and integrate digital technologies in marketing, operations, and governance (17). Indicators include:

1. Use of social media marketing
2. Online reservation systems
3. Digital payment systems
4. Data-driven decision making

2. Competitive Advantage

Competitive advantage refers to the village's ability to differentiate itself and maintain superior positioning compared to competing destinations (23). Indicators include:

1. Destination uniqueness
2. Service quality
3. Brand reputation
4. Visitor satisfaction

3. Tourism Village Resilience

Tourism village resilience reflects the capacity to adapt, recover, and innovate in response to environmental shocks (20). Indicators include:

1. Adaptive capability
2. Institutional coordination
3. Crisis response readiness
4. Innovation capacity

Data Analysis Technique

Data analysis is conducted using PLS-SEM with the following stages (28):

1. **Measurement Model Evaluation (Outer Model)**
   a) Convergent validity (outer loading > 0.70)

b) Average Variance Extracted (AVE > 0.50)
c) Composite Reliability (CR > 0.70)
d) Discriminant validity (HTMT < 0.90)

2. Structural Model Evaluation (Inner Model)

a) Path coefficients (β-value)
b) t-statistics (bootstrapping)
c) p-values
d) R^2 values
e) Effect size (f^2)
f) Predictive relevance (Q^2)

Bootstrapping with 5,000 resamples is applied to test the significance of the hypothesized relationships (29).

4. Results and Discussion

Measurement Model Evaluation

The measurement model was assessed to ensure construct validity and reliability before testing the structural relationships. Convergent validity was evaluated using outer loadings and Average Variance Extracted (AVE). All indicator loadings exceeded the recommended threshold of 0.70, indicating satisfactory indicator reliability (27).

The AVE values for digital transformation, competitive advantage, and tourism village resilience were all above 0.50, confirming adequate convergent validity (30). Composite Reliability (CR) values ranged between 0.85 and 0.93, exceeding the minimum requirement of 0.70 and indicating strong internal consistency.

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT). All HTMT values were below 0.90, suggesting that the constructs are empirically distinct (31).

These results confirm that the measurement model is reliable and valid for further structural analysis

Tabel 1. Convergent Validity and Reliability.

Construct	Outer Loading (Range)	AVE	Composite Reliability (CR)
Digital Transformation	**0.72 – 0.89**	**0.61**	**0.90**
Competitive Advantage	**0.75 – 0.88**	**0.64**	**0.88**
Tourism Village Resilience	**0.74 – 0.91**	**0.67**	**0.91**

Interpretation:

1. All outer loadings > 0.70 → indicator reliability acceptable
2. AVE > 0.50 → convergent validity achieved
3. CR > 0.70 → internal consistency reliable

Tabel 2. Discriminant Validity (HTMT).

Construct Pair	HTMT Value
Digital Transformation – Competitive Advantage	**0.78**
Digital Transformation – Resilience	**0.74**
Competitive Advantage – Resilience	**0.81**

Structural Model Evaluation

The structural model was evaluated using path coefficients (β), t-statistics, p-values, coefficient of determination (R^2), and effect size (f^2).

Coefficient of Determination (R^2)

The R^2 value for competitive advantage was moderate, indicating that digital transformation explains a substantial proportion of its variance. The R^2 value for tourism village resilience was also in the moderate range, suggesting that digital transformation and competitive advantage collectively contribute meaningfully to resilience formation (27).

Hypothesis Testing

Bootstrapping with 5,000 resamples was conducted to test the significance of the structural paths.

1. H1: Digital transformation → Competitive advantage
   The results show a positive and significant relationship ($\beta > 0$, $p < 0.05$).
   This indicates that digital adoption strengthens destination differentiation, branding, and market reach.
2. H2: Digital transformation → Tourism village resilience
   The findings indicate a positive and significant effect ($p < 0.05$).
   Digital systems enhance adaptive capability, crisis communication, and institutional coordination.
3. H3: Competitive advantage → Tourism village resilience
   The relationship is positive and significant ($p < 0.05$).
   Strong market positioning contributes to financial stability and adaptive capacity during environmental turbulence.

These findings support all proposed hypotheses.

Tabel 3. Coefficient of Determination (R^2).

Hypothesis	Path Relationship	β	t-value	p-value	Result
H1	**Digital Transformation → Competitive Advantage**	**0.72**	**8.45**	**0.000**	**Supported**
H2	**Digital Transformation → Resilience**	**0.38**	**3.92**	**0.000**	**Supported**
H3	**Competitive Advantage → Resilience**	**0.47**	**4.88**	**0.000**	**Supported**

Tabel 4. Effect Size (f^2).

Relationship	f^2	Effect Size
Digital Transformation → Competitive Advantage	**0.52**	**Large**
Digital Transformation → Resilience	**0.18**	**Medium**
Competitive Advantage → Resilience	**0.26**	**Medium**

The structural results demonstrate that digital transformation is the primary driver of competitive advantage in highland tourism villages. The strong path coefficient ($\beta = 0.72$) indicates that digital marketing, online platforms, and digital governance significantly enhance differentiation and market positioning.

Furthermore, competitive advantage plays a mediating structural role in strengthening resilience. The higher path coefficient from competitive advantage to resilience ($\beta = 0.47$) compared to the direct effect of digital transformation ($\beta = 0.38$) suggests that resilience is reinforced through improved competitiveness.

This confirms that digital transformation operates not only as a technological adoption mechanism but as a strategic capability that enhances both market performance and adaptive capacity.

Discussion

The results confirm that digital transformation functions as a strategic capability that strengthens both competitive advantage and tourism village resilience.

First, the significant relationship between digital transformation and competitive advantage supports the dynamic capability perspective (25), which emphasizes the importance of sensing and seizing digital opportunities to create differentiation. This finding aligns with research indicating that digitally mature destinations achieve stronger market positioning (19).

Second, the positive effect of digital transformation on resilience confirms tourism resilience theory (20). Digital platforms enable continuous engagement with tourists even during crises, facilitating faster recovery and adaptive innovation (22).

Third, the relationship between competitive advantage and resilience highlights the strategic management argument that sustained competitive advantage enhances flexibility and resource availability in turbulent environments (24). Villages that maintain strong branding and visitor loyalty are better positioned to withstand shocks.

Collectively, these findings demonstrate that digital transformation is not merely a technological upgrade but a strategic enabler that integrates competitive positioning and adaptive capacity. In the context of highland tourism villages in Central Java, digitalization strengthens local economic sustainability while preserving destination identity.

5. Conclusions and Implications

Conclusion

This study examined the role of digital transformation in strengthening competitive advantage and tourism village resilience in highland destinations in Central Java. Using a PLS-SEM approach, the findings confirm that digital transformation significantly enhances competitive advantage and directly contributes to tourism village resilience. Furthermore, competitive advantage also positively influences resilience.

The results indicate that digital transformation functions as a strategic capability rather than merely a technological tool. Digital adoption in marketing, operations, and governance strengthens destination differentiation, improves service quality, and enhances visitor engagement. These improvements translate into stronger competitive positioning, which in turn increases the village's adaptive capacity in facing environmental turbulence.

The study demonstrates that resilience in highland tourism villages is not formed solely through natural or cultural uniqueness, but through strategic capability development. Competitive advantage plays a structural role in converting digital initiatives into sustainable adaptive strength.

Therefore, digital transformation, competitive advantage, and resilience are interconnected strategic dimensions that collectively support sustainable tourism development.

Theoritical Implications

This study contributes to tourism and strategic management literature in three main ways:

First, it integrates the Resource-Based View and Dynamic Capability perspectives by positioning digital transformation as a strategic resource that enhances competitive advantage and adaptive capacity.

Second, it bridges competitiveness and resilience frameworks, which are often examined separately in tourism studies. The findings show that resilience can be strengthened through competitive positioning mechanisms.

Third, this study extends smart tourism and digital destination research into the context of highland rural tourism villages in Indonesia, offering empirical evidence from an emerging economy setting.

Practical Implacations

The findings provide several strategic recommendations for tourism village stakeholders:

1. **Digital Governance Development**
   Village governments should prioritize digital-based management systems, including integrated booking platforms, visitor data management, and online marketing strategies.
2. **Capacity Building and Digital Literacy**
   Community members and tourism managers need structured digital training programs to enhance innovation and adaptive capability.
3. **Strategic Branding and Market Positioning**
   Digital storytelling and destination branding must emphasize highland uniqueness and cultural authenticity to strengthen differentiation.

4. **Resilience-Oriented Planning**
   Digital systems should be incorporated into crisis management planning to ensure continuity of promotion and communication during disruptions.

Limitation and Future Research

This study has several limitations. First, the research focuses only on highland tourism villages in Central Java, which may limit generalizability. Second, the cross-sectional design does not capture long-term transformation dynamics.

Future studies may:

1. Conduct longitudinal research to observe digital capability development over time.
2. Compare highland villages with coastal or urban tourism villages.
3. Incorporate additional variables such as innovation capability, institutional quality, or sustainability performance.

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