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Research Paper

Digital financial innovation, smart tourism ecosystems and destination competitiveness: a framework for sustainable tourism development in Jammu & Kashmir

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ABSTRACT

Jammu & Kashmir (J&K) is a major tourism destination with substantial natural, cultural, religious and experiential resources, but its tourism sector also faces seasonality, congestion, uneven destination development, infrastructure constraints and limited integration among stakeholders. This study examines how digital innovation and digital financial innovation can strengthen a smart tourism ecosystem, destination competitiveness and sustainable tourism development. The proposed framework integrates five constructs: Digital Innovation (DI), Smart Tourism Ecosystem (STE), Digital Financial Innovation (DFI), Destination Competitiveness (DC) and Sustainable Tourism Development (STD). A quantitative cross-sectional design was used with 400 respondents comprising tourists and tourism-related stakeholders. Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The measurement model demonstrates satisfactory indicator loadings, internal consistency and convergent and discriminant validity. The structural results show significant positive effects of DI on STE ($\beta = 0.681$, $p < 0.001$), STE on DFI ($\beta = 0.487$, $p < 0.001$), DFI on DC ($\beta = 0.462$, $p < 0.001$), and DC on STD ($\beta = 0.528$, $p < 0.001$). DFI also has a significant direct effect on STD ($\beta = 0.214$, $p < 0.001$). The model explains 46.4% of STE, 52.9% of DFI, 61.2% of DC and 57.1% of STD. Significant mediation and serial mediation effects support the pathway DI → STE → DFI → DC → STD. The findings indicate that digital transformation contributes more effectively to sustainable tourism when supported by integrated digital ecosystems, accessible financial services and stronger destination capabilities. The study contributes a finance-oriented perspective to smart tourism research and provides implications for tourism authorities, financial institutions, enterprises and local communities in J&K.

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1. INTRODUCTION

Tourism is becoming more and more technology-dependent and networked activity. Digitalisation – through digital platforms, mobile applications, artificial intelligence, Internet of Things technologies, data analytics and online services – has transformed the way tourists search for information, choose destinations, make reservations, communicate with providers and transact business [1], [2], [3]. So destinations will compete not only on the basis of natural and cultural assets but also on the base of their capacity to offer connected, accessible, efficient and sustainable services.

Smart tourism is an ecosystem in which the technologies and data interact, along with tourists, tourism enterprises, governments and communities in order to generate value [4], [5], [6]. The studies on smart destinations highlight interoperability, coordination of stakeholders, real-time information and data-driven destination management [5], [7]. But the benefits of digitalisation do not simply occur on its own; they rely on the presence of infrastructure, organisation skills, governance and stakeholder engagement [8], [9].

The context of the state of Jammu & Kashmir is relevant as it has a tourism economy that encompasses known destinations as well as rural and emerging destinations. The region offers employment and entrepreneurship opportunities, as well as seasonality, congestion, environmental pressure and spatial imbalance, but also opportunities for local economic development [10]. Digital platforms can enhance information, destination marketing, visitor-flow management and service integration. Concurrently, digital financial services can help to mitigate transactional hassles and enhance access to formal financial services for tourism businesses [11].

So digital finance is one of the crucial but not yet fully integrated aspects of smart tourism. There are recent evidence that digital financial inclusion can help achieve tourism development, tourism demand and tourism entrepreneurship [12], [13], [14]. However, most of the literature of smart tourism looks at technology, visitor experience and destination competitiveness in isolation from financial innovation. This study aims to do that integration by developing an empirical model that combines digital innovation, smart tourism, digital financial innovation, destination competitiveness and sustainable tourism development [15].

The main research pathway is DI to STE to DFI to DC to STD. The study thus examines how digital innovation affects the technological capacity to build an integrated tourism ecosystem that can support financial innovation and whether the capacity to engage in financial innovation is linked to sustainable tourism outcomes.

2. RELATED WORK

2.1 Smart Tourism and Destination Competitiveness

Smart tourism research is conceptualised as a destination as an ecosystem of a collection of isolated services. [4] Stress the need for the technology integration, data and stakeholders [5] the relationship between smart tourism ecosystems and destination competitiveness. Buhalis and Leung [6] also emphasize the linkages and interoperability between tourism services. The usage of smart technologies has a positive impact on personalisation, information access and visitor experience [3]; the development of ICT has a wider impact on tourism management and service delivery [7]. Therefore,

destination competitiveness has turned into multi-dimensional. Along with the traditional tourism resource, digital infrastructure, service quality, accessibility, innovation, and institutional capability can be supported [5], [15]. This is relevant to J&K as digital capabilities could be used to link known destinations with lesser-known destinations and to enhance the efficiency of tourism services.

2.2 Digital Financial Innovation and Tourism

Digital financial innovations are defined as digital payment systems, mobile financial services, electronic financial services, financial innovation platforms and other systems and technologies which enhance the efficiency, transparency, security and financial accessibility of financial transactions [11]. [12] Find that DFI positively influences tourism development, [13] find that it has positive impacts on domestic tourism demand. Peng and Wu [14] also relate digital inclusive finance to sustainable tourism development. The findings indicate that digital finance must be considered as a part of the tourism ecosystem, and not just as a payment service. Notwithstanding this evidence, in the literature financial innovation is not often presented as a direct link between smart tourism capabilities and destination competitiveness.

2.3 Research Gap and Theoretical Foundation

The study has three motivating gaps. One, prior research tends to be on the technology level instead of the level of digital capability on the destination. Secondly, smart-tourism studies are often conducted on tourists or businesses rather than as a complete part of the destination ecosystem. Thirdly, digital financial innovations are still underdeveloped and not fully connected with models involving smart tourism and competitiveness and sustainability. The study is based, therefore, on the smart tourism ecosystem perspective [4], [5] and digital-finance perspective [12], [13], [14].

2.4 Conceptual Framework and Hypotheses

The conceptual framework specifies DI as the antecedent capability, STE as the integrating ecosystem mechanism, DFI as the financial mechanism, DC as the competitive outcome and STD as the sustainability outcome. Structural relationships are hypothesized within and between all constructs both directly and indirectly as shown in Figure 1

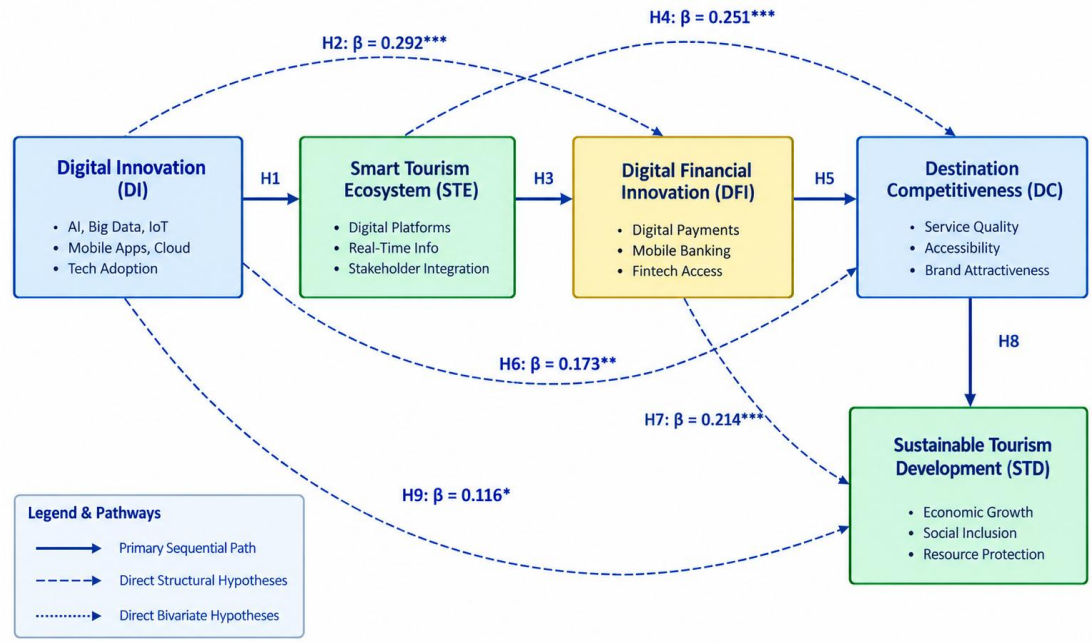


Figure 1. Conceptual Framework of Digital Financial Innovation and Smart Tourism Ecosystems

These formal hypotheses are presented:

H1: Digital Innovation has a positive effect on Smart Tourism Ecosystem.

H2: Digital Financial Innovation is positively influenced by Digital Innovation.
H3: Digital Financial Innovation is positively influenced by Smart Tourism Ecosystem.
H4: Smart Tourism Ecosystem positively affects the Destination Competitiveness.
H5: If Digital Financial Innovation has a positive effect on Destination Competitiveness, it will do so.
H6: Digital Innovation positively impacts Destination Competitiveness.
Based on the above, the following hypotheses will be tested:
H8: Destination Competitiveness positively affects Sustainable Tourism Development.
H9: Sustainable Tourism Development is positively influenced by Digital Innovation.
• Significant mediating and serial mediating pathways are found between the core constructs (i.e., H10 → H15 → H10-H15), and (i.e., DC → STD → DI → STE → DFI → H10).

3. METHODOLOGY

3.1 Research Design and Sample

The study is designed quantitatively, cross sectional. Primary data was gathered from 400 respondents from tourists and the stakeholders related to tourism in Jammu & Kashmir. The sample is composed of tourists, tourism business operators, residents and institutional stakeholders, resulting in a balance of the demand and supply side, Table 1. The answers were collected on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Table 1. Respondent Composition (N = 400)

Respondent Category	Frequency	Percentage (%)
Tourist	220	55.0
Tourism business/operator	82	20.5
Local resident/community	54	13.5
Tourism/another stakeholder	44	11.0
Total	400	100.0

3.2 Measurement and Data Analysis

Reflective indicators adapted from the literature were used to assess five latent constructs. Measurement reliability, validity, and structural path coefficients were evaluated using Partial Least Squares Structural Equation Modelling (PLS-SEM) method by SmartPLS [16], [17]. The robustness of the model was checked using predictive relevance (Q^2) and effect size (f^2) [18].

4. RESULTS AND DISCUSSION

4.1 Respondent Profile and Digital Usage

Table 2. Demographic Profile of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	232	58.0
	Female	168	42.0
Age	18–25	76	19.0
	26–35	118	29.5
	36–45	104	26.0
	46–55	67	16.8
	Above 55	35	8.7
Education	Secondary	42	10.5
	Graduate	136	34.0
	Postgraduate	164	41.0
	Professional/Other	58	14.5

Table 2 shows that the sample is predominantly male (58.0%), while females account for 42.0%. Most respondents belong to the 26-35 age group (29.5%), followed by the 36-45 group (26.0%), which together make up 55.5% of the sample. Younger respondents aged 18-25 represent 19.0%, whereas those above 55 years form the smallest group (8.7%). In terms of education, postgraduates are the largest group (41.0%), followed by graduates (34.0%), so about three-quarters of the respondents (75.0%) hold a graduate or postgraduate degree. This suggests that the respondents are well placed to assess digital tourism and financial services.

Table 3. Tourism Experience and Digital Usage

Measure	Category	Frequency	Percentage (%)
J&K Visits	First visit	96	24.0
	2–3 visits	128	32.0
	4–5 visits	91	22.8
	More than 5	85	21.2
Digital Tourism Usage	Rarely	36	9.0
	Occasionally	82	20.5
	Frequently	156	39.0
	Very frequently	126	31.5
Digital Payment Usage	Low	34	8.5
	Moderate	97	24.3
	High	164	41.0
	Very high	105	26.2

Table 3 shows that most respondents are not first-time visitors: 76.0% have visited J&K more than once, and 21.2% have visited more than five times. Digital tourism usage is high, with 70.5% of respondents using digital tourism services frequently or very frequently, while only 9.0% use them rarely. A similar pattern appears for digital payments: 67.2% report high or very high usage, and only 8.5% report low usage. These results indicate that the respondents are familiar with digital tourism platforms and digital payment systems, which supports the relevance of the study's constructs [19], [20].

4.2 Measurement Model Assessment

"As Shown in Table 4. The measurement model showed good reliability and convergent validity". The indicator loadings were all greater than 0.70. All constructs had Cronbach's Alpha values higher than 0.85 and composite reliability (CR) values higher than 0.65, while average variance extracted (AVE) values were higher than 0.65.

Table 4. Construct Reliability and Convergent Validity

Construct	Cronbach's α	rho_A	CR	AVE
Digital Innovation (DI)	0.889	0.891	0.918	0.691
Smart Tourism Ecosystem (STE)	0.901	0.903	0.926	0.716
Digital Financial Innovation (DFI)	0.908	0.910	0.931	0.730
Destination Competitiveness (DC)	0.891	0.894	0.919	0.694
Sustainable Tourism Dev. (STD)	0.912	0.914	0.934	0.739

4.3 Structural Model and Hypothesis Testing

The results from the structural evaluation confirm that all the primary direct hypotheses are supported at $p < 0.001$ Table 5. The results of the structural path coefficients are graphically represented in Figure 2. which shows that DI has an impact on STE and DC on STD with strength.

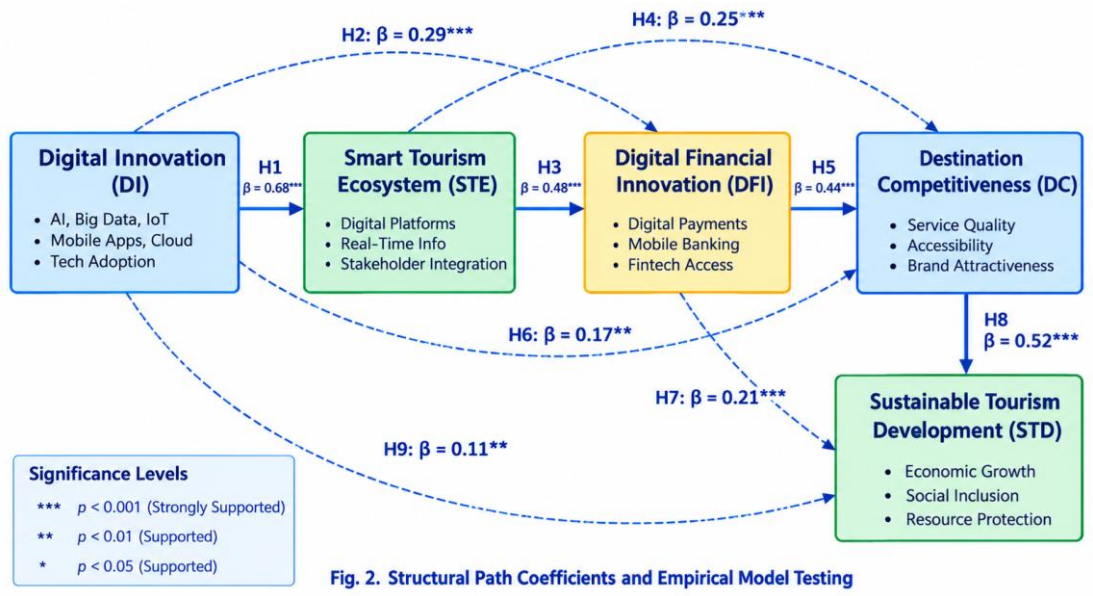


Figure 2. Structural Path Coefficients and Explained Variance (R^2)

Table 5. Direct Structural Relationships

Hypothesis	Path	Path (β)	t-value	p-value
H1	DI → STE	0.681	17.84	<0.001
H2	DI → DFI	0.292	5.63	<0.001
H3	STE → DFI	0.487	9.71	<0.001
H4	STE → DC	0.251	4.86	<0.001
H5	DFI → DC	0.462	8.92	<0.001
H6	DI → DC	0.173	3.42	0.001
H7	DFI → STD	0.214	4.18	<0.001
H8	DC → STD	0.528	10.46	<0.001
H9	DI → STD	0.116	2.31	0.021

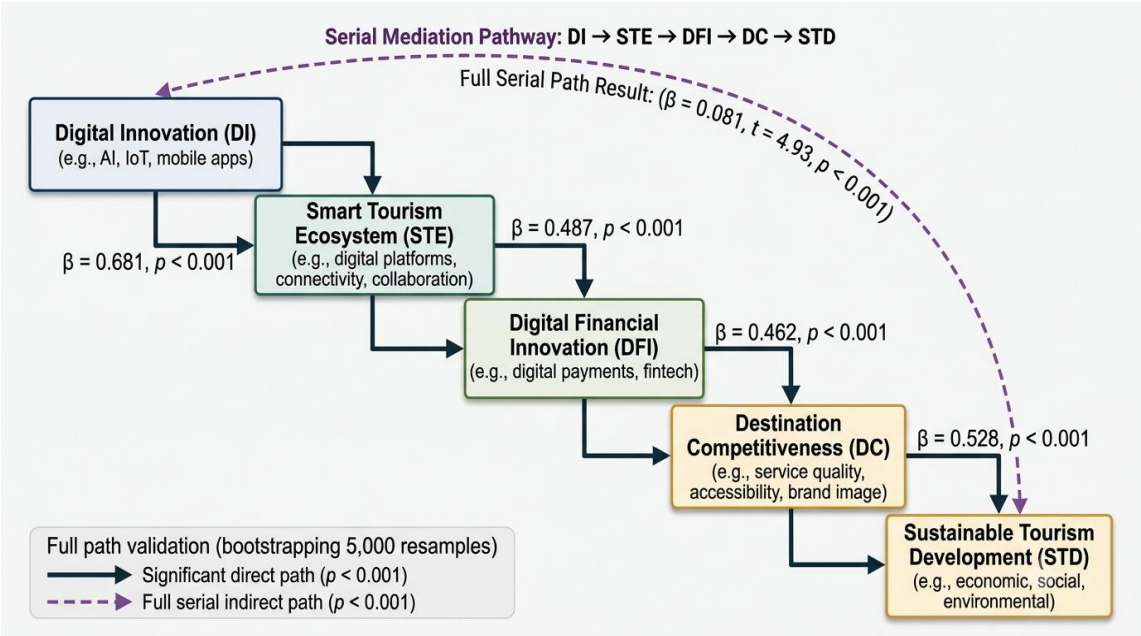


Figure 3. Serial Mediation Framework Mapping Digital Capability to Sustainable Tourism

4.4 Serial Mediation Analysis

To test the complex indirect mechanisms, bootstrapping with 5,000 resamples was performed. As mapped out in Figure 3, the full serial path DI → STE → DFI → DC → STD is positive and statistically significant (β = 0.081, t = 4.93, p < 0.001), validating the cascading role of digital and financial ecosystem capabilities.

5. CONCLUSION

This study empirically validated that digital financial innovation and smart tourism ecosystem plays a key role in boosting destination competitiveness and sustainable tourism development in Jammu &Kashmir. The development of digital financial infrastructure is key to policy interventions, in addition to smart tourism technologies.

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Author Contributions Statement

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Dr. Ajaz Ahmad Bhat	✓	✓	✓	✓		✓		✓	✓	✓	✓			✓

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The author has no financial, personal, or professional conflicts of interest to declare that might be interpreted as potential bias in the interpretation or report of this paper.

Informed Consent

All individual respondents in the survey research were obtained informed consent. Participants were informed that they were free to participate and would be kept anonymous.

Ethical Approval

The study protocol was approved and carried out, in accordance with the ethical standards and guidelines for conducting academic research with human subjects at the institution.

Data Availability

All the survey data produced and analyzed in the present study will be available from the corresponding author when reasonably requested in an academic context.

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