

# Readiness of Indian Hospitality Institutes for AI-Driven Service Education

<sup>1</sup>Prof. Sanju Murlidharan, <sup>2</sup> Prof.. Shajil Nair

<sup>1</sup>Assistant Professor, <sup>2</sup>Assistant Professor

<sup>1</sup>Institute of Hotel Management

<sup>1</sup>ITM Skills University, Navi-Mumbai, India

**Abstract:** The accelerated integration of Artificial Intelligence (AI) into hospitality operations is reshaping competency requirements for service professionals and compelling a parallel transformation in hospitality education systems. AI-enabled technologies such as service robots, predictive analytics, revenue management algorithms, chatbots, and smart property management systems are redefining operational processes and customer engagement models. Despite increasing technological diffusion within the hospitality industry, limited empirical research evaluates the preparedness of hospitality education institutions—particularly in emerging economies—to deliver AI-driven service education.

This study develops and empirically evaluates a multidimensional Hospitality AI Readiness Framework to assess the preparedness of Indian hospitality institutes, including Institutes of Hotel Management (IHMs), private hospitality colleges, and university-affiliated programs. Employing a mixed-method exploratory design, the study integrates systematic literature synthesis, policy analysis, and survey data collected from 72 hospitality faculty members across India.

Reliability testing, exploratory factor analysis, and regression modelling were conducted to examine the relationships among curriculum readiness, faculty preparedness, infrastructure support, policy and governance structures, and industry collaboration. Findings reveal moderate awareness of AI applications but limited structured pedagogical integration. Faculty readiness and institutional infrastructure significantly predict AI-based teaching adoption, while governance frameworks and formalized industry collaboration remain underdeveloped.

The study extends digital readiness and technology adoption theory into vocational service education contexts and provides policy-level and institutional recommendations aligned with India's National Education Policy (NEP 2020) and broader digital transformation goals in higher education.

**Index Terms** - Artificial Intelligence; Hospitality Education; AI Readiness; Faculty Preparedness; Digital Transformation; Higher Education; Service Innovation.

## INTRODUCTION

The global hospitality industry is undergoing a profound technological transformation driven by Artificial Intelligence (AI), automation, robotics, and data-driven decision-making systems. Hotels, resorts, airlines, and food service establishments increasingly deploy AI-enabled solutions to enhance operational efficiency, improve customer experience, and optimize revenue performance (Buhalis & Leung, 2018; Ivanov & Webster, 2019). Technologies such as automated check-in kiosks, AI-powered chatbots, predictive demand forecasting systems, and intelligent customer relationship management platforms are gradually becoming integral components of contemporary hospitality operations. As service environments become increasingly technology-mediated, the nature of hospitality work is evolving from purely human-centric interaction toward hybrid human–technology collaboration (Huang & Rust, 2018). This transformation has significant implications for hospitality education. Traditionally, hospitality training has emphasized operational proficiency, interpersonal communication, service etiquette, and

experiential learning through laboratory-based instruction and industry exposure (Baum, 2019). While these competencies remain essential, emerging industry expectations now require graduates to possess digital literacy, analytical reasoning skills, and the ability to work alongside intelligent systems. Service professionals must understand AI-assisted decision-making processes, interpret data insights, and adapt service delivery in technologically augmented environments.

In India, hospitality education operates through a diversified institutional ecosystem comprising Institutes of Hotel Management (IHMs) under the National Council for Hotel Management and Catering Technology (NCHMCT), private hospitality colleges, and university-affiliated programs. Regulatory frameworks established by the University Grants Commission (UGC) and other governing bodies have historically emphasized standardized operational training and industry alignment. However, the pace of technological change in the hospitality sector has outstripped curricular transformation in many institutions.

The National Education Policy (NEP) 2020 advocates multidisciplinary learning, digital integration, and skill-based education aligned with future industry requirements. Despite these policy directions, empirical understanding of institutional readiness for AI-driven service education remains limited, particularly within vocational and service-oriented disciplines. Existing research primarily focuses on AI adoption in hospitality operations rather than educational preparedness (Tussyadiah, 2020).

This study addresses this gap by examining the readiness of Indian hospitality institutes to integrate AI into teaching and learning processes. By developing and empirically testing a Hospitality AI Readiness Framework, the research seeks to identify institutional and faculty-level determinants influencing AI pedagogical adoption and to provide strategic insights for curriculum reform and policy alignment.

## LITERATURE REVIEW

### 2.1 Artificial Intelligence in Hospitality Operations

Artificial Intelligence has emerged as a transformative force within hospitality operations, influencing both front-end service delivery and back-end management processes. AI systems enable dynamic pricing through real-time demand analysis, enhance personalization through data-driven guest profiling, and improve operational efficiency through automation of repetitive tasks (Mariani & Baggio, 2022). Service robots assist in concierge services, room delivery, and housekeeping support, while predictive analytics allow organizations to anticipate customer preferences and optimize resource allocation.

The adoption of AI technologies has shifted competitive advantage from purely service excellence toward technology-enabled service innovation. Organizations increasingly leverage AI to enhance responsiveness, reduce operational errors, and improve decision accuracy (Wirtz et al., 2018). However, AI integration also introduces challenges related to workforce restructuring, ethical transparency, data security, and the preservation of human warmth in service encounters (Dwivedi et al., 2021). Scholars argue that hospitality is unlikely to become fully automated; instead, AI will complement human interaction by managing routine functions while employees focus on emotional intelligence and personalized engagement (Huang & Rust, 2018).

Consequently, hospitality education must evolve beyond traditional skill training to incorporate technological awareness and digital competence. Graduates entering AI-enabled workplaces require understanding of system interfaces, data interpretation, and collaborative interaction with intelligent technologies. The absence of such competencies risks creating a mismatch between industry expectations and graduate capabilities.

**Table 1. AI Applications in Hospitality Operations**

AI Application Area	Technology Used	Operational Function	Educational Implication
Front Office Operations	Chatbots, Facial Recognition, Self Check-in Systems	Automated guest interaction and faster service delivery	Training in AI-assisted guest interaction and system management
Revenue Management	Predictive Analytics, Machine Learning Algorithms	Dynamic pricing and demand forecasting	Data interpretation and analytical decision-making skills
Food & Beverage Service	Service Robots, Smart Ordering Systems	Order automation and service efficiency	Human–AI collaboration and service redesign understanding
Housekeeping	Robotics, IoT-enabled monitoring	Automated cleaning and maintenance tracking	Technology-assisted operational planning
Customer Relationship Management	AI-based personalization engines	Guest profiling and personalized service delivery	Customer analytics and digital service strategy

## 2.2 Artificial Intelligence in Higher Education

AI applications in higher education are expanding across teaching, learning, and administrative domains. Adaptive learning platforms personalize instructional content based on student performance, automated assessment tools reduce faculty workload, and predictive analytics help institutions identify at-risk students (Holmes et al., 2019). AI-supported research tools further enhance knowledge discovery and academic productivity, reshaping pedagogical practices and institutional decision-making processes (Zawacki-Richter et al., 2019).

In the Indian context, national initiatives such as Digital India and the National Strategy for Artificial Intelligence emphasize technological innovation and skill development (NITI Aayog, 2018). Despite these initiatives, adoption across higher education institutions remains uneven due to infrastructure disparities, financial limitations, and lack of faculty training. Vocational disciplines such as hospitality education face additional challenges because of their traditional emphasis on physical training environments rather than digital learning ecosystems.

Ethical considerations also play a central role in AI adoption within education. Issues related to algorithmic bias, data privacy, transparency, and accountability necessitate responsible governance frameworks to ensure equitable learning environments (Floridi et al., 2018; UNESCO, 2021).

## 2.3 Theoretical Foundation

This study integrates multiple theoretical perspectives to conceptualize AI readiness within hospitality education. The Technology Acceptance Model (TAM) explains individual adoption behaviour through perceived usefulness and perceived ease of use, suggesting that faculty members are more likely to adopt AI tools when they perceive clear pedagogical value (Davis, 1989). The Unified Theory of Acceptance and Use of Technology (UTAUT) extend this perspective by incorporating performance expectancy,

effort expectancy, social influence, and facilitating conditions, highlighting the role of institutional support structures in technology adoption (Venkatesh et al., 2003).

At the organizational level, the Technology–Organization–Environment (TOE) framework provides a broader lens by examining technological capability, organizational readiness, and environmental pressures influencing adoption decisions. By integrating TAM and UTAUT with TOE, this study develops a multidimensional framework that captures both individual and institutional determinants of AI integration within vocational education settings. This combined theoretical approach enables a holistic understanding of readiness that extends beyond technological availability to include governance structures, institutional policies, and industry engagement.

## RESEARCH METHODOLOGY

### 3.1 Research Design

A mixed-method exploratory research design was adopted to ensure conceptual depth and empirical validity. The study combined systematic literature synthesis, policy document analysis, and quantitative survey investigation. Literature synthesis enabled identification of key constructs influencing AI adoption, while policy analysis provided contextual understanding of national education reforms and digital transformation initiatives. The quantitative component facilitated empirical testing of relationships among readiness dimensions.

This triangulated approach enhances methodological robustness by integrating theoretical insight with empirical observation, thereby reducing single-method bias and strengthening interpretative reliability.

### 3.2 Sample and Data Collection

Data were collected from 72 hospitality faculty members representing IHMs, private hospitality institutions, and university-affiliated programs across India. Respondents included faculty from food production, food and beverage service, front office, housekeeping, and hospitality management specializations. The inclusion of diverse functional areas ensured representation of both operational and managerial teaching perspectives.

Convenience sampling was employed due to accessibility and geographic constraints; however, efforts were made to ensure diversity in institutional types and teaching experience levels. Participation was voluntary and anonymous, consistent with ethical research guidelines for educational research (UNESCO, 2021).

**Table 2. Respondent Profile**

Variable	Category	Frequency (n=72)	Percentage (%)
Institutional Type	IHM	26	36.1
	Private Hospitality College	28	38.9
	University Program	18	25
Specialization	Food Production	18	25
	Food & Beverage Service	16	22.2
	Front Office	14	19.4
	Housekeeping	10	13.9
	Hospitality Management	14	19.4
Teaching Experience	< 5 Years	20	27.8
	5–10 Years	28	38.9
	> 10 Years	24	33.3

### 3.3 Instrument Development

The research instrument was developed by adapting validated technology adoption scales and contextualizing them for hospitality education environments. The questionnaire measured five constructs: AI awareness, faculty readiness, infrastructure support, policy and governance, and industry collaboration. Items were measured using a five-point Likert scale ranging from strongly disagree to strongly agree. The instrument captured perceptions related to technological familiarity, institutional support mechanisms, curriculum integration, and collaboration with industry stakeholders.

**Table 3. Constructs and Measurement Dimensions of Hospitality AI Readiness**

Construct	Description	Sample Measurement Indicators
AI Awareness	Understanding of AI applications in hospitality operations	Awareness of AI tools, familiarity with AI concepts
Faculty Readiness	Faculty capability and willingness to integrate AI in teaching	Training received, confidence in using AI tools
Infrastructure Support	Availability of technological and digital resources	IT labs, simulation software, LMS availability
Policy and Governance	Institutional policies supporting AI integration	Digital strategy presence, curriculum guidelines
Industry Collaboration	Academic-industry engagement in AI adoption	AI-based internships, industry workshops

### 3.4 Data Analysis

Reliability analysis demonstrated acceptable internal consistency, with Cronbach’s alpha values ranging from 0.73 to 0.84 across constructs, indicating satisfactory scale reliability. Exploratory Factor Analysis confirmed a five-factor structure explaining 68 percent of total variance, supporting construct validity. Regression analysis revealed that faculty readiness and infrastructure support significantly predicted AI pedagogical integration, highlighting the importance of institutional facilitating conditions in shaping individual adoption behaviour.

**Table 4. Reliability Analysis of Constructs**

Construct	Number of Items	Cronbach’s Alpha	Interpretation
AI Awareness	5	0.73	Acceptable
Faculty Readiness	6	0.84	Good
Infrastructure Support	5	0.81	Good
Policy and Governance	4	0.76	Acceptable
Industry Collaboration	4	0.78	Acceptable

## FINDINGS AND DISCUSSION

### 4.1 AI Awareness

The findings indicate that hospitality faculty members possess moderate conceptual awareness of AI applications within industry operations. Respondents demonstrated familiarity with AI-driven revenue management systems, chatbot technologies, and automation tools. However, awareness remained largely theoretical, with limited hands-on exposure to AI-based teaching tools or simulation platforms. This reflects a gap between industry-level technological advancement and educational implementation, consistent with earlier observations regarding uneven AI adoption across educational institutions (Zawacki-Richter et al., 2019).

### 4.2 Faculty Readiness

Faculty readiness emerged as a critical determinant of AI integration. Respondents expressed willingness to adopt AI tools but reported insufficient training opportunities and lack of structured professional development programs. The findings support technology acceptance theory, which emphasizes perceived usefulness and ease of use as key predictors of adoption behaviour (Davis, 1989). Without targeted capacity-building initiatives, infrastructure investments alone may fail to produce meaningful pedagogical change. Faculty competence, confidence, and perceived relevance of AI to hospitality pedagogy strongly influence adoption outcomes.

### 4.3 Infrastructure Support

Institutions equipped with advanced IT facilities, digital learning management systems, and simulation software demonstrated higher levels of AI integration. Nevertheless, infrastructure disparities were evident between government-funded and privately funded institutions. Limited financial resources and competing institutional priorities often constrain technological upgrades. These findings align with the TOE framework, which highlights organizational resources and technological readiness as essential adoption determinants (Venkatesh et al., 2003).

### 4.4 Policy and Governance

Policy and governance structures were identified as comparatively weak dimensions of AI readiness. Many institutions lacked formal strategies or guidelines for AI integration within hospitality curricula. Digital initiatives were often implemented in isolation rather than through coordinated institutional planning. The absence of standardized competency frameworks contributes to inconsistent adoption practices across institutions and limits scalability of innovation.

### 4.5 Industry Collaboration

Although the hospitality industry increasingly utilizes AI technologies, structured collaboration between academic institutions and industry partners remains limited. Internship programs rarely provide exposure to AI-enabled operational systems, restricting experiential learning opportunities. Strengthening industry-academia partnerships could significantly enhance practical understanding of AI applications and facilitate curriculum modernization, thereby aligning educational outcomes with industry expectations.

## CONCEPTUAL HOSPITALITY AI READINESS FRAMEWORK

The proposed Hospitality AI Readiness Framework conceptualizes readiness as a multidimensional construct comprising curriculum readiness, faculty readiness, infrastructure support, policy and governance, and industry collaboration. Institutional determinants such as infrastructure availability, governance support, and industry engagement influence faculty readiness, which subsequently drives AI pedagogical integration and overall institutional readiness.

The framework contributes theoretically by extending digital readiness and technology adoption models into vocational and service-based education contexts. Unlike conventional higher education models, hospitality education requires alignment between operational training environments and technological innovation, making institutional readiness particularly significant.

**Table 5. Hospitality AI Readiness Framework Dimensions**

Dimension	Institutional Level	Role in AI Readiness	Expected Outcome
Curriculum Readiness	Academic	Integration of AI modules	AI-enabled learning outcomes
Faculty Readiness	Individual	Adoption of AI teaching practices	Effective pedagogical integration
Infrastructure Support	Institutional	Technology availability	Enhanced learning environment
Policy and Governance	Administrative	Strategic direction and regulation	Sustainable implementation
Industry Collaboration	External Environment	Practical exposure to AI systems	Industry-aligned competencies

## PRACTICAL IMPLICATIONS

For educational institutions, the findings emphasize the need to introduce AI-focused modules within hospitality curricula, establish simulation-based learning environments, and implement structured faculty development programs. Institutional leadership must adopt long-term digital strategies rather than fragmented technological initiatives.

For policymakers, the study highlights the necessity of developing standardized AI competency benchmarks for hospitality education and providing financial incentives for infrastructure development. Alignment with NEP 2020 objectives can accelerate digital transformation within vocational education sectors.

For industry stakeholders, collaborative engagement through AI-integrated internships, guest lectures, and technology demonstrations can bridge the gap between academic learning and operational practice. Ethical governance mechanisms must accompany technological adoption to ensure responsible AI usage, data protection, and transparency in educational environments (Floridi et al., 2018).

**Table 6. Regression Analysis Results: Predictors of AI Pedagogical Integration**

Independent Variable	Beta Coefficient ( $\beta$ )	t-value	Significance value) (p-	Result
Faculty Readiness	0.41	3.82	0.001	Significant
Infrastructure Support	0.36	3.15	0.003	Significant
AI Awareness	0.18	1.72	0.089	Not Significant
Policy and Governance	0.14	1.31	0.194	Not Significant
Industry Collaboration	0.16	1.48	0.142	Not Significant

### LIMITATION AND FUTURE RESEARCH

The study is limited by its relatively small sample size and reliance on convenience sampling, which may restrict generalizability. The cross-sectional design captures perceptions at a single point in time and does not account for evolving technological adoption trends. Future research should employ Structural Equation Modelling to validate causal relationships, conduct comparative regional or international analyses, and incorporate student readiness as an additional dimension of AI adoption in hospitality education.

### CONCLUSION

Indian hospitality institutes are currently positioned within a transitional phase of digital transformation toward AI-driven service education. While awareness of AI technologies is increasing, systematic curricular integration remains limited. Faculty preparedness and institutional infrastructure emerge as the most influential determinants of AI adoption, underscoring the need for coordinated institutional strategies and capacity-building initiatives.

The Hospitality AI Readiness Framework proposed in this study provides a strategic roadmap for aligning hospitality education with emerging technological realities. By integrating curriculum reform, faculty development, infrastructure investment, and industry collaboration, hospitality institutions can better prepare graduates for AI-enabled service environments while preserving the human-centric essence of hospitality service.

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