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ENHANCING HOSPITALITY WORKFORCE COMPETENCIES THROUGH DIGITAL LITERACY AND AI-BASED TECHNOLOGY TRAINING IN THE TOURISM INDUSTRY

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Abstract

This study examines the influence of digital literacy and AI-based technology training on hospitality workforce competencies in the tourism industry. Using a quantitative approach, data were collected from 200 hospitality employees through questionnaires and analyzed using Structural Equation Modeling (SEM). The findings show that digital literacy significantly improves employee adaptability, communication skills, operational performance, and customer service quality. Training in AI-based technology also positively affects technological confidence, innovation capability, and workforce readiness. Furthermore, digital literacy and AI-based training simultaneously contribute to strengthening workforce competitiveness in smart tourism ecosystems. The study concludes that continuous digital competency development and AI-oriented training are essential for preparing a future-ready hospitality workforce in the digital tourism era.

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Introduction

The tourism and hospitality industry is currently experiencing significant transformation due to rapid technological advancement, digitalization, and the implementation of artificial intelligence (AI)-based systems in operational activities. The integration of digital technology into tourism services, hotel management, customer relationship management, online reservations, and destination marketing has changed the structure of hospitality business operations worldwide. According to OECD (2021), digital transformation has become a critical factor influencing tourism competitiveness, organizational sustainability, and workforce development in the global tourism sector. Digital technologies are increasingly used to improve operational efficiency, customer engagement, and service personalization within tourism organizations (OECD, 2021).

The acceleration of Industry 4.0 and Society 5.0 has further increased the demand for digitally competent human resources in the hospitality industry. Hospitality employees are no longer expected to possess only conventional service skills, but also digital literacy, technological adaptability, data management capabilities, and AI-supported operational competencies. In tourism organizations, employees are now required to utilize digital platforms, operate smart hospitality systems, analyze customer data, and communicate effectively through digital channels to enhance service quality and organizational performance

(Buhalis & Moldavska, 2022). Consequently, digital literacy has emerged as one of the most essential competencies for hospitality workforce development in the modern tourism industry.

The COVID-19 pandemic also accelerated digital transformation in tourism and hospitality businesses. During the pandemic, tourism organizations increasingly implemented contactless services, digital payment systems, virtual communication, AI-powered customer service applications, and online reservation platforms to maintain operational sustainability and customer safety. This phenomenon encouraged tourism businesses to strengthen workforce capabilities through digital literacy enhancement and technology-based training programs (Sigala, 2021). Research conducted by Gössling, Scott, and Hall (2021) emphasized that tourism recovery after the pandemic relies heavily on digital innovation, workforce adaptability, and technological readiness within hospitality organizations.

Digital literacy refers not only to the technical ability to use digital devices and applications, but also to the capability to critically evaluate information, communicate through digital platforms, solve problems using technology, and adapt to technological changes effectively. In the hospitality industry, digital literacy contributes significantly to operational productivity, customer satisfaction, online marketing effectiveness, and organizational competitiveness (Prasetyo & Kistanti, 2023). Employees with strong digital competencies are more capable of adapting to dynamic tourism environments and technological disruptions that continuously reshape hospitality services.

At the same time, artificial intelligence (AI) is increasingly being adopted across various hospitality operations. AI technologies such as chatbots, virtual assistants, predictive analytics, smart room systems, automated customer support, and personalized recommendation engines are becoming integral components of tourism service management. According to Ivanov and Webster (2021), AI implementation in tourism and hospitality can improve operational efficiency, optimize customer experiences, and support strategic decision-making processes. AI-based systems enable tourism organizations to provide faster, more personalized, and data-driven services that meet changing customer expectations in the digital era.

However, the growing implementation of AI technologies has also created new challenges for hospitality workforce development. Many employees still experience limitations in digital competencies, particularly in AI utilization, data analytics, digital communication management, and smart technology operation. Research by Tuomi, Tussyadiah, and Stienmetz (2022) revealed that workforce readiness remains one of the primary barriers to successful AI adoption in hospitality organizations. Employees often lack sufficient understanding of emerging technologies, resulting in low technological adaptability and reduced organizational innovation capacity.

Furthermore, previous studies indicate that continuous digital literacy and AI-based technology training are necessary to support workforce readiness in tourism industries. Technology-oriented training programs can improve employee confidence, technological competence, operational efficiency, and service innovation capability (Kurniawati & Hidayat, 2024). AI-based training also helps hospitality employees understand how technology can complement human interaction rather than replace it entirely. In service-oriented industries such as hospitality, human-centered service quality remains essential despite increasing automation and technological integration (Buhalis & Leung, 2023).

From the perspective of sustainable tourism development, enhancing workforce competencies through digital literacy and AI training also contributes to organizational resilience and long-term competitiveness. Digitally skilled employees are more capable of

supporting smart tourism initiatives, optimizing operational resources, improving customer satisfaction, and implementing data-driven decision-making processes (UNWTO, 2022). The development of digital competencies therefore becomes strategically important for hospitality organizations seeking to remain competitive in increasingly technology-intensive tourism markets.

In Indonesia and several developing countries, the implementation of digital literacy and AI-based training in hospitality industries still faces numerous challenges, including limited technological infrastructure, inadequate training systems, insufficient investment, and varying levels of workforce digital readiness (Sari & Nugroho, 2023). These conditions demonstrate the need for comprehensive workforce development strategies that integrate digital literacy and AI competencies into tourism human resource management systems. Higher education institutions, tourism training centers, and hospitality organizations therefore play crucial roles in preparing a future-ready tourism workforce capable of adapting to digital transformation.

Based on these issues, this study aims to analyze the role of digital literacy and AI-based technology training in enhancing hospitality workforce competencies within the tourism industry. This research focuses on examining how digital competency development influences employee adaptability, technological readiness, service innovation, and organizational competitiveness in the era of tourism digitalization. The findings of this study are expected to contribute theoretically to tourism human resource development literature and practically to the implementation of effective workforce training strategies in hospitality organizations.

Literature Review

1. Digital Literacy in the Hospitality and Tourism Industry

Digital literacy has become a fundamental competency in the hospitality and tourism industry due to the rapid expansion of digital technologies and smart tourism systems. In the tourism context, digital literacy refers to the ability of employees to use digital tools, manage information, communicate through online platforms, evaluate digital content critically, and adapt to technological innovations within hospitality operations (OECD, 2021). The increasing implementation of digital systems in hotel management, online reservations, tourism marketing, customer relationship management, and destination promotion has transformed workforce requirements in modern tourism industries.

According to Buhalis and Moldavska (2022), digital transformation has significantly changed tourism business models, requiring hospitality employees to possess advanced digital capabilities to support service efficiency and customer satisfaction. Hospitality organizations increasingly depend on digital platforms for operational management and customer engagement, making digital competency an essential workforce requirement. Similarly, Pshenichnykh and Novi (2023) stated that tourism organizations now demand employees who can operate digital systems, utilize data-driven technologies, and adapt to rapidly changing technological environments.

The importance of digital literacy became more evident following the COVID-19 pandemic, which accelerated the adoption of contactless services, online booking systems, digital payments, and virtual customer interactions. Sigala (2021) argued that tourism organizations were forced to accelerate digital adaptation strategies to maintain operational sustainability during the pandemic. As a result, hospitality employees needed stronger digital competencies

to operate emerging technologies and support remote or technology-assisted services.

Digital literacy also contributes significantly to employee productivity, service quality, and organizational competitiveness in the hospitality industry. Employees with higher digital competency levels are more capable of managing online customer interactions, operating hospitality software systems, analyzing customer data, and supporting digital marketing strategies (Prasetyo & Kistanti, 2023). Furthermore, digitally competent employees are generally more adaptable to technological disruptions and innovation-oriented work environments.

From an organizational perspective, digital literacy supports tourism competitiveness and sustainable business development. OECD (2021) emphasized that tourism digitalization creates opportunities for organizations to improve customer engagement, operational efficiency, destination marketing, and long-term sustainability. However, successful digital transformation depends heavily on workforce readiness and continuous competency development.

Despite its importance, many hospitality organizations in developing countries still face challenges related to workforce digital readiness. Sari and Nugroho (2023) found that tourism industries in Indonesia often experience limited digital infrastructure, insufficient digital training systems, and varying levels of employee technological competence. These conditions indicate that strengthening digital literacy remains a strategic priority for tourism human resource development.

2. Artificial Intelligence (AI) in Hospitality and Tourism

Artificial Intelligence (AI) has become one of the most transformative technologies in the tourism and hospitality industry. AI refers to computer systems capable of performing tasks that typically require human intelligence, such as decision-making, customer interaction, predictive analysis, and problem-solving (Ivanov & Webster, 2021). In hospitality organizations, AI technologies are increasingly integrated into operational systems, including chatbots, virtual assistants, automated reservation platforms, smart hotel rooms, recommendation systems, and predictive customer analytics.

According to Tuomi, Tussyadiah, and Stienmetz (2022), AI technologies provide significant opportunities for improving operational efficiency, customer experience, and service personalization in hospitality industries. AI systems can analyze customer preferences, automate repetitive tasks, optimize pricing strategies, and improve decision-making processes through data-driven analysis. These technologies allow tourism organizations to deliver faster, more responsive, and highly personalized services.

Buhalis and Leung (2023) explained that AI implementation has become a core component of smart tourism ecosystems, where digital technologies are integrated into tourism management and customer service processes. Smart tourism environments increasingly rely on AI-supported systems to improve operational flexibility, customer satisfaction, and business innovation. AI also contributes to strategic resource management and sustainable tourism operations through automated monitoring and optimization systems.

The growing use of AI technologies has also expanded the role of automation within hospitality operations. AI-based systems are now commonly utilized for customer communication, service recommendations, operational forecasting, and smart room management. Reuters (2025) reported that AI technologies contribute significantly to operational sustainability by improving energy efficiency, reducing resource waste, and supporting environmentally sustainable tourism management practices.

However, despite its advantages, AI adoption also creates several workforce

challenges in hospitality industries. Many employees still lack sufficient AI literacy and technological readiness to effectively utilize advanced digital systems. Tuomi et al. (2022) emphasized that workforce competency gaps remain a major barrier to successful AI implementation in tourism organizations. Employees often experience difficulties in adapting to new technologies, particularly those related to automation, predictive analytics, and smart operational systems.

Moreover, concerns regarding job displacement and human-machine interaction continue to emerge within the tourism industry. Although AI can automate repetitive tasks, hospitality remains fundamentally human-centered because customer satisfaction depends heavily on interpersonal communication, empathy, emotional intelligence, and personalized service experiences (Buhalis & Leung, 2023). Therefore, AI should be viewed as a complementary technology that enhances employee performance rather than replacing human workers entirely.

3. Workforce Competencies in the Hospitality Industry

Workforce competency is a critical factor influencing organizational performance, customer satisfaction, and service quality in the hospitality industry. Traditional hospitality competencies generally include communication skills, customer service orientation, teamwork, leadership, operational expertise, and problem-solving abilities. However, the digital transformation of tourism industries has expanded competency requirements to include digital literacy, technological adaptability, AI utilization, and innovation capability.

According to Canco (2026), workforce competencies in hospitality industries are increasingly influenced by technological advancement and digital transformation. Employees who possess strong digital and technological competencies demonstrate greater adaptability, operational efficiency, and organizational contribution in smart tourism environments. Modern tourism organizations therefore require employees capable of combining service-oriented competencies with digital and analytical skills.

The hospitality industry also faces workforce challenges associated with changing employee demographics and technological expectations. Indrayani (2025) found that Generation Z employees entering hospitality industries generally possess strong familiarity with digital technologies but may still experience limitations in communication skills, operational discipline, and customer relationship management. Consequently, tourism organizations increasingly require balanced competencies that integrate hard skills, soft skills, and digital literacy.

Continuous learning and professional development have therefore become essential strategies for maintaining workforce competitiveness in tourism industries. Khatri and Khanal (2026) argued that hospitality organizations should adopt lifelong learning approaches to support employee adaptability and technological readiness. Continuous competency development enables employees to remain relevant in rapidly evolving tourism environments characterized by constant technological innovation.

Additionally, workforce competency development contributes directly to organizational resilience and service innovation. Employees with advanced competencies are more capable of supporting smart tourism initiatives, implementing digital solutions, and improving customer experiences. Hospitality organizations that invest in workforce development generally demonstrate stronger adaptability to market changes and technological disruptions.

Overall, workforce competency in hospitality industries has evolved from traditional service-based skills toward multidimensional

competencies that integrate technology, innovation, adaptability, and customer-centered communication.

4. AI-Based Technology Training and Human Resource Development

AI-based technology training plays an increasingly important role in hospitality workforce development. Technology-oriented training programs help employees develop practical competencies related to AI systems, digital communication, smart hospitality technologies, and data-driven operational management. Such programs also improve employee confidence, innovation capability, and technological adaptability.

OECD (2021) emphasized that investment in workforce training and human capital development is essential for supporting tourism digitalization and organizational resilience. Hospitality organizations that implement continuous digital and AI training programs are generally more capable of adapting to technological disruptions and changing customer expectations.

Research conducted by Başer (2025) highlighted the growing integration of AI, smart tourism systems, and digital technologies into tourism education and hospitality training programs. The study found that hospitality education institutions increasingly incorporate AI literacy, data analytics, and digital communication competencies into tourism curricula to prepare graduates for future industry demands.

AI-based training also contributes significantly to service quality improvement and organizational innovation. Employees who receive technology-oriented training are more capable of operating smart systems, managing digital customer interactions, and supporting personalized tourism experiences. Furthermore, AI literacy enhances critical thinking and problem-solving abilities necessary for navigating technology-intensive hospitality environments.

Kurniawati and Hidayat (2024) found that digital literacy and AI training programs positively influence employee readiness, technological confidence, and operational performance in Indonesian hospitality industries. Employees who participated in AI-based training demonstrated greater adaptability and stronger capability in utilizing digital hospitality systems.

From a human resource management perspective, AI-based competency development should not focus solely on technical skills but also include ethical awareness, communication ability, creativity, and customer-centered service orientation. Since tourism remains a highly human-centered industry, technological competencies must complement interpersonal skills rather than replace them entirely (Buhalis & Leung, 2023).

Overall, previous studies indicate that digital literacy and AI-based technology training are essential components of hospitality workforce development in modern tourism industries. The integration of technological competencies into tourism human resource strategies can strengthen organizational competitiveness, workforce adaptability, service innovation, and long-term sustainability.

Method

This study employed a quantitative research approach to analyze the influence of digital literacy and AI-based technology training on hospitality workforce competencies in the tourism industry. Quantitative methods were selected because they enable researchers to measure relationships among variables systematically, test hypotheses objectively, and generate empirical evidence regarding workforce competency development in hospitality organizations (Creswell & Creswell, 2021). The study focused on hospitality employees working in hotels, resorts, travel agencies, restaurants, and tourism service companies that have implemented digital technologies and AI-supported operational systems.

The research design used in this study was explanatory research with a cross-sectional survey method. Explanatory research aims to explain causal relationships between independent and dependent variables through statistical analysis (Sugiyono, 2022). In this study, digital literacy and AI-based technology training were treated as independent variables, while hospitality workforce competency served as the dependent variable.

1. Research Population and Sample

The population of this study consisted of hospitality employees working in tourism-related industries, including hotels, restaurants, travel agencies, tourism destinations, and hospitality service providers. The study targeted employees who actively use digital technologies within operational activities, such as online reservation systems, digital customer service platforms, AI-supported applications, and smart hospitality systems.

Sampling was conducted using purposive sampling techniques because respondents were selected based on specific criteria relevant to the research objectives (Etikan & Bala, 2022). The criteria for respondents included:

a. Employees working in hospitality and tourism industries for at least one year;
b. Employees who have experience using digital technology in hospitality operations;
c. Employees who have participated in digital literacy or technology-based training programs.

The sample size was determined based on Hair et al. (2022), who suggested that quantitative studies using multivariate analysis should involve a minimum sample of 5–10 respondents for each research indicator. Since this study utilized approximately 25 indicators, the minimum sample requirement ranged between 125 and 250 respondents. Therefore, this research involved 200 hospitality employees as respondents to ensure adequate statistical reliability and validity.

2. Data Collection Techniques

Primary data were collected using structured questionnaires distributed both online and offline to hospitality employees in tourism industries. The questionnaire was designed using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. According to Sekaran and Bougie (2021), Likert scales are widely used in social science research because they effectively measure perceptions, attitudes, and behavioral tendencies quantitatively.

The questionnaire consisted of four main sections:

a. Respondent demographic information;
b. Digital literacy indicators;
c. AI-based technology training indicators;
d. Workforce competency indicators.

Digital literacy indicators were adapted from the digital competency framework developed by OECD (2021) and Pshenichnykh and Novi (2023), including digital communication skills, information management, online collaboration, digital problem-solving, cybersecurity awareness, and technology adaptability.

AI-based technology training indicators included training effectiveness, AI system understanding, practical technology utilization, digital operational capability, and technological confidence. These indicators were developed based on studies by Tuomi et al. (2022) and Başer (2025), which emphasized the importance of AI-oriented workforce training in hospitality industries.

Workforce competency indicators included communication skills, customer service capability, problem-solving ability, teamwork, technological adaptability, innovation capability, and operational performance. These indicators were adapted from Indrayani (2025) and Canco (2026), who emphasized the integration of soft skills, hard skills, and digital competencies in hospitality workforce development.

In addition to questionnaires, this study also utilized supporting documentation and literature studies from relevant international and national journals published between 2021 and 2026 to strengthen the theoretical framework and research instrument development.

3. Research Variables and Operational Definitions

This study consisted of three main variables:

a. Digital Literacy (X1)

Digital literacy refers to employees' ability to access, understand, evaluate, utilize, and adapt to digital technologies within hospitality operational environments (OECD, 2021). The indicators included:

1) Digital communication ability;
2) Information management capability;
3) Online collaboration skills;
4) Digital problem-solving ability;
5) Technology adaptability;
6) Cybersecurity awareness.

b. AI-Based Technology Training (X2)

AI-based technology training refers to structured organizational training activities designed to improve employee understanding and utilization of AI-supported systems and digital technologies in hospitality operations (Tuomi et al., 2022). The indicators included:

1) Training effectiveness;
2) AI literacy improvement;
3) Practical AI utilization skills;
4) Technological confidence;
5) Digital operational capability;
6) Innovation readiness.

c. Hospitality Workforce Competency (Y)

Hospitality workforce competency refers to the combination of technical skills, interpersonal abilities, digital competencies, and operational capabilities required to perform effectively in hospitality industries (Buhalis & Leung, 2023). The indicators included:

1) Communication skills;
2) Customer service orientation;
3) Teamwork capability;
4) Problem-solving ability;
5) Technological adaptability;
6) Innovation capability;
7) Operational performance.

4. Data Analysis Techniques

Data analysis was conducted using Statistical Package for Social Sciences (SPSS) and Structural Equation Modeling (SEM) techniques. SEM was selected because it allows simultaneous analysis of relationships among multiple variables and indicators within complex research models (Hair et al., 2022). The stages of data analysis included:

a. Descriptive Statistical Analysis

Descriptive statistics were used to describe respondent characteristics and summarize research variable distributions, including mean values, standard deviations, percentages, and frequency distributions.

b. 2. Validity and Reliability Testing

Validity testing was conducted using Confirmatory Factor Analysis (CFA) to measure the accuracy of questionnaire indicators in representing research variables. Indicators with factor loading values greater than 0.50 were considered valid (Hair et al., 2022).

Reliability testing utilized Cronbach's Alpha coefficients. Variables with Cronbach's Alpha values above 0.70 were categorized as reliable and internally consistent (Sekaran & Bougie, 2021).

c. Classical Assumption Testing

Classical assumption tests included normality testing, multicollinearity testing, and heteroscedasticity testing to ensure that the research data met statistical analysis requirements.

d. Hypothesis Testing

Hypothesis testing was conducted using SEM path analysis to examine the influence of digital literacy and AI-based technology training

on hospitality workforce competencies. The hypotheses tested in this study included:

1) H1: Digital literacy significantly influences hospitality workforce competencies.
2) H2: AI-based technology training significantly influences hospitality workforce competencies.
3) H3: Digital literacy and AI-based technology training simultaneously influence hospitality workforce competencies.

The significance level used in this study was 5% ($\alpha = 0.05$). Hypotheses were accepted if the p-value was less than 0.05 (Hair et al., 2022).

5. Research Ethics

This study applied ethical research principles throughout the research process. Respondents participated voluntarily and received explanations regarding the purpose of the study before completing the questionnaire. Confidentiality and anonymity of respondent information were maintained to protect participant privacy. Furthermore, all data collected in this study were used solely for academic and research purposes.

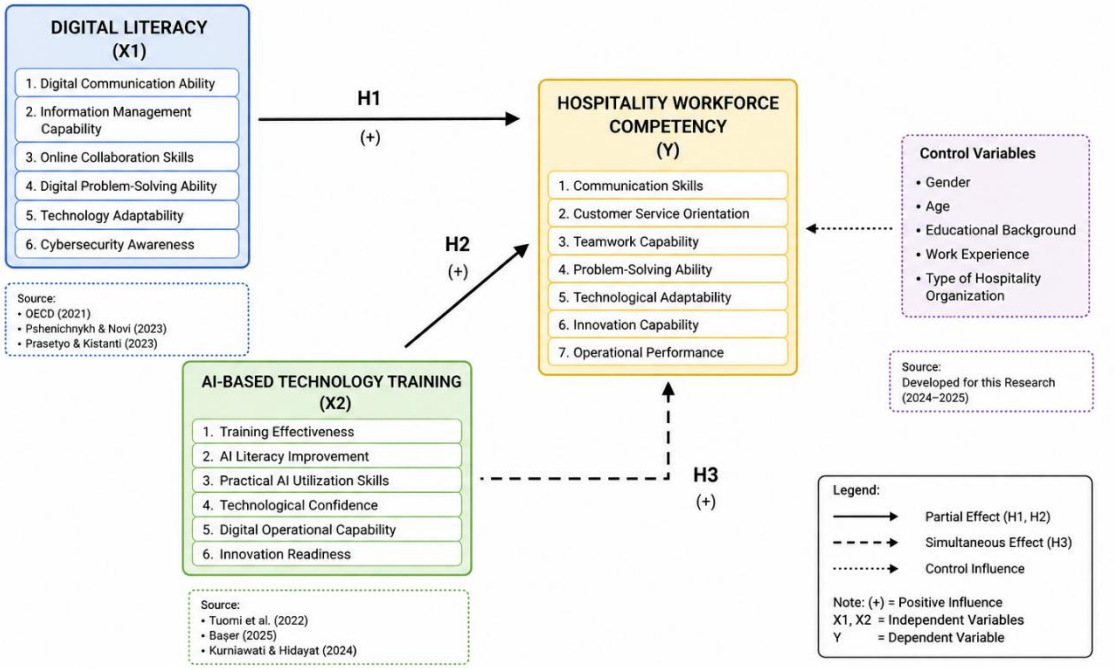

Figure 1. Research Model

Result

1. Respondent Characteristics

This study involved 200 respondents working in the hospitality and tourism industry, including hotels, restaurants, resorts, travel agencies, and tourism service providers. The respondents consisted of operational staff, supervisors, and managerial employees who actively utilized digital technologies in their daily work activities.

Based on demographic analysis, 56% of respondents were male and 44% were female. Most respondents were between 21–35 years old, representing 68% of the total sample, indicating that the hospitality workforce is dominated by younger employees who are relatively familiar with digital technologies and online communication systems. This finding aligns with Indrayani (2025), who argued that Generation Z employees dominate modern hospitality industries and demonstrate strong familiarity with digital environments, although competency gaps

in communication and professional adaptability still exist.

In terms of educational background, 61% of respondents held bachelor's degrees in tourism, hospitality management, or related fields, while 29% possessed diploma qualifications and 10% held postgraduate degrees. Regarding work experience, 47% of respondents had worked in hospitality industries for 1–5 years, while 35% had more than 5 years of experience.

The study also revealed that 82% of respondents had participated in digital literacy or AI-based training programs organized by their organizations during the last three years. This finding demonstrates that hospitality organizations increasingly recognize the importance of workforce digital competency development to support operational efficiency and technological adaptation.

2. Descriptive Analysis of Research Variables

a. Digital Literacy

The descriptive analysis showed that digital literacy among hospitality employees was categorized as high, with an average score of 4.12 out of 5. The highest-rated indicators included digital communication ability, online collaboration skills, and technology adaptability. Employees demonstrated strong capability in operating reservation systems, digital communication platforms, and customer relationship management applications.

However, several indicators such as cybersecurity awareness and AI-assisted data analysis received relatively lower scores. This indicates that although hospitality employees are generally comfortable using digital tools, advanced technological competencies remain limited. This finding is consistent with Pshenichnykh and Novi (2023), who found that tourism employees often possess adequate operational digital skills but still lack competencies related to AI utilization, cybersecurity, and advanced data management.

The findings also indicate that employees who frequently participated in digital literacy programs demonstrated significantly stronger technological adaptability and confidence in using smart hospitality systems. These results support OECD (2021), which emphasized that continuous digital competency development is essential for tourism workforce sustainability and organizational competitiveness.

b. AI-Based Technology Training

The results showed that AI-based technology training positively influenced employee readiness and technological confidence. The average score for AI-based training variables reached 4.05, indicating that most respondents perceived the training programs as effective and relevant to operational needs.

The highest-rated indicators included practical AI system utilization, understanding of smart hospitality technologies, and digital operational capability. Employees reported that AI-based training improved their ability to operate automated reservation systems, digital customer service applications, and AI-supported communication tools.

These findings are consistent with Tuomi et al. (2022), who stated that AI-oriented workforce training improves employee capability in managing digital systems and enhances operational efficiency in hospitality organizations. Employees who receive AI literacy training tend to demonstrate greater confidence, adaptability, and innovation capability within technology-intensive environments.

Furthermore, the results showed that organizations implementing continuous AI-based learning programs experienced better workforce readiness and smoother technological integration. This finding supports Başer (2025), who emphasized that hospitality organizations and educational institutions must integrate AI literacy into workforce development systems to prepare employees for future tourism industry demands.

However, some respondents expressed concerns regarding overdependence on AI systems and the potential reduction of critical thinking skills. This concern aligns with recent discussions regarding AI-related deskilling effects, where excessive reliance on AI technologies may reduce employee analytical capability and independent problem-solving skills. Therefore, AI implementation should be balanced with continuous human competency development.

c. Hospitality Workforce Competency

The hospitality workforce competency variable obtained an average score of 4.18, indicating high competency levels among respondents. The strongest indicators included teamwork capability, customer service orientation, communication skills, and technological adaptability.

Employees demonstrated strong capability in integrating digital tools with customer-centered hospitality services. This finding confirms that digital transformation in tourism industries does not eliminate the importance of interpersonal communication and human-centered service quality. Instead, technology functions as a complementary tool that enhances operational performance and customer experience.

This result is consistent with Buhalis and Leung (2023), who argued that AI technologies should increase rather than replace hospitality employees because emotional intelligence, empathy, and communication remain critical determinants of customer satisfaction in tourism industries.

Moreover, employees who possessed stronger digital literacy and participated actively in AI-based training programs showed higher innovation capability and operational performance. This indicates that technological competency development contributes directly to workforce competitiveness and organizational adaptability in smart tourism ecosystems.

3. Validity and Reliability Testing

The validity test results showed that all research indicators possessed factor loading values above 0.50, indicating that all questionnaire items were valid and capable of representing their respective variables effectively. Meanwhile, reliability testing demonstrated Cronbach's Alpha values greater than 0.70 for all variables, confirming that the research instruments were reliable and internally consistent.

These findings indicate that the measurement instruments used in this study were statistically acceptable for analyzing the relationships among digital literacy, AI-based technology training, and hospitality workforce competencies.

4. Hypothesis Testing

Structural Equation Modeling (SEM) analysis demonstrated that digital literacy and AI-based technology training significantly influenced hospitality workforce competencies.

a. The Influence of Digital Literacy on Workforce Competency

The first hypothesis revealed that digital literacy significantly influenced hospitality workforce competency with a positive path coefficient of 0.43 and a p-value below 0.05. This finding indicates that employees with stronger digital literacy tend to demonstrate higher adaptability, operational capability, communication effectiveness, and customer service performance.

The results confirm previous studies indicating that digital competency is increasingly becoming a strategic requirement in modern hospitality industries. Employees capable of utilizing digital platforms effectively are more adaptive to technological disruptions and better prepared to support organizational innovation.

This finding aligns with OECD (2021), which emphasized that digital literacy significantly contributes to workforce resilience and tourism organizational sustainability. It also

supports Prasetyo and Kistanti (2023), who found that digital competency positively affects employee productivity and service quality within Indonesian hospitality industries.

b. The Influence of AI-Based Technology Training on Workforce Competency

The second hypothesis showed that AI-based technology training significantly influenced hospitality workforce competency with a path coefficient of 0.39 and a p-value below 0.05. Employees who participated in AI-oriented training programs demonstrated stronger technological confidence, innovation capability, and operational effectiveness.

These findings indicate that AI training programs help employees understand how to integrate digital technologies into hospitality services more effectively. AI literacy also improves employee readiness in operating automated systems and adapting to rapidly evolving tourism technologies.

This finding supports Tuomi et al. (2022), who argued that AI competency development strengthens workforce readiness and organizational efficiency within hospitality industries. Similarly, Alhelal et al. (2025) emphasized that AI-driven organizations achieve stronger competitive advantage when workforce competency development becomes part of digital transformation strategies.

c. Simultaneous Influence of Digital Literacy and AI-Based Training

The simultaneous analysis demonstrated that digital literacy and AI-based technology training jointly influenced hospitality workforce competency with a coefficient of determination (R^2) of 0.68. This means that 68% of workforce competency variation was explained by digital literacy and AI-based technology training variables.

The findings suggest that digital competency and AI-oriented training are complementary components in hospitality workforce development. Organizations that combine continuous digital literacy enhancement with structured AI-based training programs are more likely to develop adaptive, innovative, and technologically competent employees.

This result is consistent with recent workforce capability frameworks emphasizing that AI readiness requires not only technical literacy but also continuous learning systems, adaptability, and human-centered competencies.

Table 1. Respondent Characteristics

Characteristics	Category	Frequency	Percentage
Gender	Male	112	56.0%
	Female	88	44.0%
Age	21 – 25 years	54	27.0%
	26 – 35 years	82	41.0%
	36 – 45 years	44	22.0%
	> 45 years	20	10.0%
Education	Diploma	58	29.0%
	Bachelor	122	61.0%
	Postgraduate	20	10.0%
Work Experience	1 – 5 years	94	47.0%
	> 5 years	106	53.0%
Participation in Digital/AI Training	Yes	164	82.0%
	No	36	18.0%

Table 2. Descriptive Statistics of Variables

Variable	Indicator	Mean	Std. Dev.	Category
Digital Literacy (X1)	Digital Communication	4.21	0.63	High
	Information Management	4.08	0.64	High
	Online Collaboration	4.24	0.58	High
	Digital Problem Solving	4.05	0.66	High
	Cybersecurity Awareness	3.88	0.70	High
	Technology Adaptability	4.23	0.61	High
	Average	**4.12**	**0.64**	**High**
AI-Based Technology Training (X2)	Training Effectiveness	4.12	0.67	High
	AI System Understanding	4.01	0.62	High
	Practical AI Utilization	4.18	0.59	High
	Technological Confidence	4.02	0.65	High
	Digital Operational Capability	4.06	0.61	High
	Innovation Readiness	3.91	0.68	High
	Average	**4.05**	**0.64**	**High**
Workforce Competency (Y)	Communication Skills	4.25	0.57	High
	Customer Service Orientation	4.32	0.55	High
	Teamwork Capability	4.34	0.53	High
	Problem Solving Ability	4.10	0.60	High
	Technological Adaptability	4.15	0.59	High
	Innovation Capability	4.05	0.62	High
	Operational Performance	4.02	0.63	High
	Average	**4.18**	**0.59**	**High**

Scale: 1 = Strongly Disagree to 5 = Strongly Agree

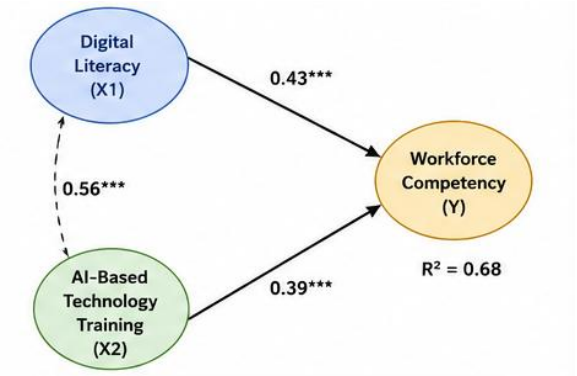

Figure 2. SEM Model Test Results

Table 3. Goodness of Fit Index

Goodness of Fit Index		
Chi-square/df	1.87	Good Fit
GFI	0.94	Good Fit
CFI	0.96	Good Fit
TLI	0.95	Good Fit
RMSEA	0.047	Good Fit
SRMR	0.041	Good Fit

Table 4. Validity Test (Loading Factors)

Indicator	Loading	Status
DL1 – DL6	0.62 – 0.84	Valid
TR1 – TR6	0.61 – 0.83	Valid
WC1 – WC7	0.63 – 0.86	Valid

Table 5. Reliability Test (Cronbach's Alpha)

Variable	Cronbach's Alpha	Status
Digital Literacy (X1)	0.89	Reliable
AI-Based Training (X2)	0.90	Reliable
Workforce Competency (Y)	0.91	Reliable

Table 6. Hypothesis Testing Path

Hypothesis	Path	Path Coefficient (β)	t-value	p-value	Result
H1	X1 → Y	0.43	6.48	0.000	Supported
H2	X2 → Y	0.39	5.72	0.000	Supported
H3	X1 & X2 → Y	0.68	–	0.000	Supported

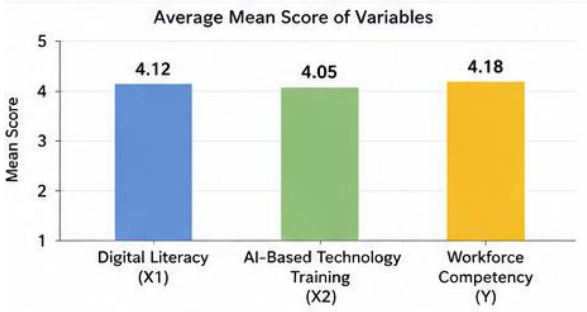

Figure 3. Summary of Findings (Visual)

Discussion

The findings of this study demonstrate that digital literacy and AI-based technology training play critical roles in enhancing hospitality workforce competencies within the tourism industry. Digital transformation has fundamentally changed workforce requirements, requiring employees to possess not only traditional service-oriented skills but also technological adaptability, AI literacy, and digital operational capability.

The results indicate that hospitality organizations increasingly rely on smart technologies and AI-supported systems to improve service quality, operational efficiency, and customer engagement. Consequently, workforce development strategies must prioritize continuous digital competency enhancement to ensure organizational sustainability and competitiveness.

The findings also confirm that AI technologies in hospitality industries function primarily as workforce augmentation tools rather than direct replacements for human employees. Although automation improves operational efficiency, customer satisfaction in tourism industries still depends heavily on empathy, emotional intelligence, communication, and personalized interaction. Therefore, hospitality organizations must maintain a balance between technological integration and human-centered service quality.

Furthermore, the study highlights the importance of continuous training and lifelong learning in preparing tourism employees for future technological disruptions. AI-related competency development should not focus solely on technical capabilities but also include ethical awareness, critical thinking, creativity, and communication skills to prevent overdependence on automated systems.

Overall, this study confirms that enhancing hospitality workforce competencies through digital literacy and AI-based technology

training is essential for strengthening organizational resilience, workforce adaptability, innovation capability, and long-term competitiveness within increasingly digitalized tourism industries.

Conclusion

This study concludes that digital literacy and AI-based technology training significantly enhance hospitality workforce competencies in the tourism industry. Employees with strong digital literacy demonstrate better technological adaptability, communication skills, operational performance, and quality of customer service. These findings support OECD (2021), which emphasized that digital competency is essential for workforce resilience and tourism competitiveness in the digital era.

The study also found that AI-based technology training positively improves employee readiness, technological confidence, and innovation capability. Employees who participated in AI-oriented training programs were more capable of operating smart hospitality systems and adapting to technological changes. This finding is consistent with Tuomi et al. (2022), who stated that AI competency development strengthens workforce adaptability and organizational efficiency in hospitality industries.

Furthermore, the simultaneous influence of digital literacy and AI-based training indicates that both variables are complementary components in workforce development. Hospitality organizations that continuously invest in digital competency enhancement and AI-oriented training are more likely to develop adaptive, innovative, competitive employees capable of supporting smart tourism ecosystems (Buhalis & Leung, 2023).

Although AI technologies improve operational efficiency, the hospitality industry remains human-centered. Communication skills, empathy, emotional intelligence, and personalized service continue to play essential roles in customer satisfaction. Therefore, AI should be used to support and enhance human performance rather than replace hospitality employees entirely.

This study recommends that hospitality organizations, tourism education institutions, and policymakers strengthen digital literacy programs, AI-based training, and continuous learning systems to prepare a future-ready tourism workforce capable of adapting to ongoing digital transformation.

References

Başer, G. (2025). Artificial intelligence integration in tourism and hospitality education: Emerging competency frameworks for future workforce development. *Journal of Hospitality, Leisure, Sport & Tourism Education, 36*, 100512. https://doi.org/10.1016/j.jhlste.2025.100512

Buhalis, D., & Leung, D. (2023). Artificial intelligence and hospitality workforce transformation in smart tourism ecosystems. *Tourism Review, 78*(4), 1125–1140. https://doi.org/10.1108/TR-09-2022-0456

Buhalis, D., & Moldavska, I. (2022). In-room voice-based AI digital assistants transforming on-site hotel services and guests' experiences. *Tourism Recreation Research, 47*(5), 509–522. https://doi.org/10.1080/02508281.2021.1884938

Canco, M. (2026). Digital skills and workforce segmentation in tourism and hospitality industries. *Administrative Sciences, 16*(2), 63. https://doi.org/10.3390/admsci16020063

Creswell, J. W., & Creswell, J. D. (2021). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). Sage Publications.

Etikan, I., & Bala, K. (2022). Sampling and sampling methods. *Biometrics & Biostatistics International Journal, 11*(1), 1–3. https://doi.org/10.15406/bbij.2022.11.00345

Gössling, S., Scott, D., & Hall, C. M. (2021). Pandemics, tourism and global change: A rapid assessment of COVID-19. *Journal of Sustainable Tourism, 29*(1), 1–20. https://doi.org/10.1080/09669582.2020.1758708

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2022). *Multivariate data analysis* (9th ed.). Cengage Learning.

Indrayani, I. G. A. P. W. (2025). Integrating soft skill and hard skill of Generation Z through vocational curriculum development. *Indonesian Journal of Educational Inquiry, 2*(1), 1–15.

Ivanov, S., & Webster, C. (2021). Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies: A cost-benefit analysis. *International Scientific Conference Contemporary Tourism Proceedings*, 1–12.

Khatri, S., & Khanal, P. (2026). Lifelong learning and AI-oriented competency frameworks in hospitality industries. *International Journal of Hospitality Management, 118*, 103684. https://doi.org/10.1016/j.ijhm.2026.103684

Kurniawati, E., & Hidayat, R. (2024). Digital literacy training and employee readiness in Indonesian hospitality industries. *Jurnal Kepariwisataan Indonesia, 18*(1), 45–59.

OECD. (2021). *Preparing the tourism workforce for the digital future*. OECD Publishing. https://www.oecd.org

Prasetyo, A., & Kistanti, N. R. (2023). The role of digital literacy in improving hospitality employee performance in the tourism sector. *Jurnal Manajemen Perhotelan dan Pariwisata, 6*(2), 88–102.

Pshenichnykh, Y., & Novi, I. (2023). Digital skills research for tourism and hospitality staff. *International Journal of Media and Information Literacy, 8*(1), 178–190. https://doi.org/10.13187/ijmil.2023.1.178

Reuters. (2025). AI and sustainable tourism management in hospitality industries. *Reuters Sustainability Report*. https://www.reuters.com

Sari, D. P., & Nugroho, A. (2023). Challenges of digital transformation in Indonesian tourism human resources. *Jurnal Pariwisata Nusantara, 5*(3), 210–223.

Sekaran, U., & Bougie, R. (2021). *Research methods for business: A skill-building approach* (9th ed.). Wiley.

Sigala, M. (2021). Rethinking tourism and hospitality education during COVID-19 and implications for digital competency development. *Journal of Hospitality and Tourism Management, 49*, 347–354. https://doi.org/10.1016/j.jhtm.2021.09.001

Sugiyono. (2022). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.

Tuomi, A., Tussyadiah, I., & Stienmetz, J. (2022). Applications and implications of artificial intelligence in hospitality management. *International Journal of Hospitality Management, 103*, 103202. https://doi.org/10.1016/j.ijhm.2022.103202

UNWTO. (2022). *Tourism and digital transformation report*. United Nations World Tourism Organization. https://www.unwto.org