Undergraduate Students' Perceptions of the Benefits and Barriers of Using GenAI Technologies to Support Tourism Management Competencies Based on Sandwith's Model

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Abstract

In an era where technology is reshaping education, generative artificial intelligence (GenAI) has emerged as a powerful tool for transforming educational practices across disciplines. Tourism Management, as an applied field requiring a blend of conceptual, interpersonal, and technical competencies, can greatly benefit from the integration of GenAI tools. However, the application of these technologies within tourism education—particularly in Arab contexts—remains limited, and few studies have examined their role in supporting domain-specific competencies through structured evaluation models. This study aims to examine the role of GenAI tools in supporting competencies for Tourism Management, based on Sandwith's Model, among undergraduate students in Jordan. It also investigates challenges students may encounter when using GenAI as a learning tool. A quantitative approach was employed, and data were collected using a structured questionnaire administered to a purposive sample of 259 undergraduate students at the participating universities in Jordan. Findings reveal high mean scores across all competency domains, indicating strong student agreement that GenAI tools significantly contribute to the development of both academic and practical skills. The technical domain received the highest average, followed by the conceptual and administrative domains. Students highlighted the value of GenAI in delivering personalized content, supporting real-time decision-making, and enabling creative, strategic thinking. Nevertheless, despite these benefits, students reported moderate challenges, particularly with internet connectivity, validating AI-generated content, and limited relevance to local tourism topics. These findings, however, should encourage decision-makers in higher education institutions to integrate GenAI tools into tourism education curricula, thereby enhancing students' competencies and preparing them for the evolving demands of the tourism industry.

Keywords: *GenAI Technologies, Tourism Management, Sandwith's Model, Competencies, Benefits, Challenges, Perceptions, Jordan.*

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Introduction

Artificial intelligence (AI) stands out as a prominent feature and key trend of the ongoing, accelerating industrial revolution, which has been widely embraced across disciplines, including education. AI technologies such as ChatGPT have been extensively adopted in educational settings, transforming the way students learn, interact with content, and develop cognitive knowledge and professional competencies (Ajlouni et al., 2023; Ibrahim & Ajlouni, 2024). AI applications are capable of reasoning, processing incomplete data, and learning by expanding computer-organized databases in a comprehensible manner. These capabilities have led to the development of many AI-based tools that are highly productive and adaptable, making them extremely valuable in educational contexts (Ocaña-Fernandez et al., 2019; Baidoo-Anu & Ansah, 2023; Rudolph et al., 2023).

The integration of AI into education has unlocked new opportunities, including personalized learning, intelligent tutoring systems, workload assistance for teachers, enhanced creative output, and more efficient content generation (Holmes & Tuomi, 2022). These innovations are reshaping traditional pedagogical models and strengthening adaptive, student-centered learning.

Tourism Management relies on a combination of practical, analytical, and interpersonal skills, and could significantly benefit from integrating AI tools to support the learning process and enhance students' competencies and readiness for the workforce. Recent research shows that Hospitality Management undergraduates often lack crucial professional competencies, indicating that Hospitality Management programs need improvement to align with the requirements of today's dynamic workforce (Raras et al., 2024).

GenAI has become a promising and valuable learning tool in the context of rapid digital transformation, due to its ability to deliver personalized content, provide real-time support, and promote self-directed learning (Banjade et al., 2024; Vieriu & Petrea, 2025; Ajlouni et al., 2023; Ibrahim & Ajlouni, 2024). However, despite its potential, significant limitations remain when integrating it into Tourism education within Arab contexts. Furthermore, recent studies have primarily examined the general educational benefits and challenges of AI, rather than its impact on developing domain-specific competencies such as those required in Tourism Management. There is also a notable lack of studies employing structured evaluation models, such as Sandwith's Competency Domain Model (SCDM), which provides a comprehensive framework for assessing

professional competencies across five key domains: conceptual, leadership, interpersonal, administrative, and technical (Raras et al., 2024; Sandwith, 1993). The strength of the model lies in its comprehensiveness and direct relevance to industry needs, as it was specifically designed for management training and has been widely adapted and validated in hospitality and tourism contexts. Its five domains offer a holistic framework that maps the precise skills necessary for success in this dynamic, service-driven sector. Framing the study within the SCDM, therefore, supports the development of the multidimensional capabilities required of future tourism managers. In turn, this approach provides practical insights for curriculum design that are directly aligned with industry competency standards, effectively bridging the gap between technological innovation and professional readiness.

In addition, this research aligns with the United Nations' Sustainable Development Goals (SDGs) (United Nations, n.d.), particularly Goal 4, "Quality Education," Goal 8, "Decent Work and Economic Growth," and Goal 9, "Industry, Innovation, and Infrastructure." It contributes to these goals by examining how AI tools can enhance the quality of tourism education. Specifically, the study investigates the extent to which GenAI technologies support the development of Tourism Management competencies among undergraduate students based on SCDM, and identifies the challenges students may encounter when using GenAI tools. It seeks to answer the following questions:

SQ1: To what extent do undergraduate Tourism Management students perceive GenAI technologies as beneficial for supporting competencies based on Sandwith's Model?

SQ2: What challenges do undergraduate Tourism Management students report when using GenAI technologies as learning tools?

Literature Review

GenAI Technologies in Education

GenAI has attracted considerable attention from researchers in educational institutions who are exploring its potential benefits and challenges (Alshammari & Al-Enezi, 2024; Chauke et al., 2024; Makeleni et al., 2023; Su & Yang, 2022; Vargas et al., 2024). It is defined as a tool that generates AI-driven content in response to user prompts, supporting a variety of tasks through

generative modeling (García-Peñalvo & Vázquez-Ingelmo, 2023; Creely & Blannin, 2025). This technology employs AI systems to create text-based content as well as images, videos, sounds, code, 3D designs, and other media formats, producing outputs that resemble human-generated content and even contributing to fields such as drug discovery (Alasadi & Baiz, 2023; Jovanovic & Campbell, 2022). By utilizing deep learning networks to analyze massive datasets, AI enables the development of adaptive and personalized learning environments tailored to individual student needs, including dynamically designed lesson plans, hands-on exercises, and interactive simulations (Alasadi & Baiz, 2023; Maity & Deroy, 2024; Shabalala, 2024). Educational applications include automated content creation such as quizzes, lecture summaries, and simulations, along with real-time feedback and interactive tools for language acquisition (Mello et al., 2023; Su & Yang, 2022). Recent technological advancements and innovations have further enhanced educational engagement through interactive content (Hwang et al., 2020) and democratized access to personalized, high-quality learning resources, thereby transforming traditional pedagogical paradigms (Baskara et al., 2024; Kumbo et al., 2023; Nedungadi et al., 2024).

The integration of GenAI into education provides advantages for enhancing pedagogical experiences and academic instruction (Alasadi & Baiz, 2023; Symeou et al., 2025). GenAI facilitates task automation, stimulates creative cognition, optimizes learning, and enables personalized educational experiences (Guettala et al., 2024). It customizes educational content based on difficulty levels and delivery methods, thereby promoting efficiency and student engagement (Alali & Wardat, 2024; Huang, 2021). In addition, GenAI provides rapid feedback, reduces teacher workload, and allows instructors to focus on more complex teaching responsibilities while maintaining academic standards (Lee & Moore, 2024). These technological advances have also supported the development of culturally responsive curricula and immersive simulations, elevating the quality and inclusivity of educational resources (García-Peñalvo, 2024; Zawacki-Richter et al., 2024).

Recent studies have explored the advantages of GenAI for enhancing undergraduate proficiencies across diverse academic disciplines, including counseling and Special Needs Education (Lund & Wang, 2023; Tlili et al., 2023; Zhai, 2023; McGrath et al., 2023; Pierrès et al., 2024). Nevertheless, GenAI implementation also presents numerous implications and concerns, including ethical

dilemmas such as AI-generated content reliability, academic integrity concerns, data privacy risks, and algorithmic biases (Alali & Wardat, 2024; De Gagne et al., 2023; Simms, 2025; Williamson et al., 2020; Batista et al., 2024; Topaz et al., 2024). These concerns require immediate action to ensure that AI integration promotes equity, transparency, academic integrity, and ethical, responsible utilization within educational contexts (Batista et al., 2024; De Gagne et al., 2023; Topaz et al., 2024). In addition, excessive dependence on AI technologies may impact human creativity, critical thinking skills, problem-solving abilities, and independent learning (Jose et al., 2024; Szmyd & Mitera, 2024; Ahmad et al., 2023; Krullaars et al., 2023), as students' problem-solving capacity may decline (Sağın et al., 2023). To address these challenges, scholars advocate for the introduction of ethical standards, accountability for algorithms, and the necessity of human oversight to balance AI-driven personalization with the essential contributions of educators (Noroozi et al., 2024; Wood & Moss, 2024). Studies exploring student perceptions of the challenges they face when using ChatGPT for academic tasks are limited, focusing primarily on concerns related to the alignment of information provided by ChatGPT with their curriculum major and delays in ChatGPT responses (Ibrahim & Ajlouni, 2024; Shoufan, 2023). In light of previous studies, researchers should further investigate the perceptions of Tourism students regarding GenAI as a learning tool, and academic institutions should emphasize the importance of AI literacy programs, the application of universal design principles, and the development of tools for identifying AI-generated content. This approach will help ensure that GenAI acts as a catalyst for inclusive innovation rather than a source of exclusion (Ng et al., 2021).

SCDM in the Context of Tourism Management

The Sandwith Competency Domain Model (SCDM) provides a robust foundation for shaping tourism education, equipping students and professionals with the multidimensional skills required in a dynamic, service-driven industry (Sandwith, 1993; Chung-Herrera et al., 2003). The SCDM, developed by Paul Sandwith (1993), identifies five interconnected skill areas critical for effective management in the tourism industry and categorizes managerial competencies into five distinct domains: (1) the "conceptual/creative domain," which involves cognitive abilities to understand tourism systems holistically and is concerned with comprehending phenomena and generating ideas for action; (2) the "leadership domain," which focuses on empowering employees and building effective teams; (3) the "interpersonal domain," which emphasizes skills for effective interaction with others, including communication skills such as writing effectively, speaking

clearly, active listening, oral presentation skills, conflict management, and negotiation; (4) the "administrative domain," which includes competencies in personnel management, accounting, and finance; and (5) the "technical domain," which concentrates on the actual work and output of an organization, encompassing specialized operational knowledge specific to tourism services (Sandwith, 1993; Katz, 1974; Tas, 1988; Kay & Russette, 2000; Tsai et al., 2006).

The conceptual domain supports strategic thinking and adaptability, which are essential for responding to the rapidly changing dynamics of the global tourism industry (Testa & Sipe, 2012). The interpersonal domain emphasizes the customer service skills required for delivering exceptional guest experiences, while the technical and administrative domains equip managers to navigate the operational complexities typical of hospitality environments (Jeou-Shyan et al., 2011). The leadership domain is particularly relevant for addressing high employee turnover and maintaining staff motivation (Tracey & Hinkin, 2008). The SCDM has been widely applied in tourism and hospitality research (Marneros et al., 2020; Chung-Herrera et al., 2003; Hu, 2010; Kay & Russette, 2000; Tsai et al., 2006; Zopiatis, 2010). Hu (2010) used the model to examine competency development for innovative culinary practices, while Kay and Russette (2000) applied it to identify essential competencies for hospitality managers. Additionally, Tsai et al. (2006) and Zopiatis (2010) validated the model's applicability within hospitality education and training programs.

GenAI and Tourism Education

The integration of GenAI into tourism education represents a paradigm shift that is preparing future generations for the dynamic industry landscape (Egeli-Çankaya et al., 2024). GenAI is revolutionizing tourism education by evolving from a basic informational resource into a dynamic, multi-functional platform for developing critical industry competencies. Its applications are primarily concentrated in four key areas: (1) creating personalized learning experiences tailored to individual student needs (Guettala et al., 2024; Egeli-Çankaya et al., 2024); (2) generating realistic, immersive simulations for risk-free practice in areas such as crisis management and customer service (Knihová, 2024; Dogru et al., 2023); (3) facilitating data-driven decision-making by teaching students to analyze market trends and develop marketing strategies (Zhang & Prebensen, 2024; Carvalho & Ivanov, 2023); and (4) supporting content creation and administrative tasks to enhance efficiency (Kasneci et al., 2023; Zafar & Ali, 2025).

As Knihová (2024) demonstrates, AI-powered tools deliver personalized learning experiences and immersive simulations that enhance student engagement while developing essential competencies in areas such as crisis management, customer service, and strategic planning. These technologies support Tourism Management education through multiple mechanisms, including the creation of adaptive learning environments, the facilitation of risk-free practice scenarios, the strengthening of intercultural communication capabilities, and the development of data literacy skills necessary for evidence-based decision-making. Smart applications in the sector include AI-controlled virtual concierge services, dynamic pricing systems that improve revenue management, and immersive virtual destination experiences that have transformed pre-trip engagement. Recent research has also examined the implications and benefits of GenAI in industrial domains, including tourism (Dwivedi et al., 2024; Saleh, 2025).

Although recent literature has highlighted the potential of AI in higher education, its applications in Tourism education—specifically its impact on building student competencies—remain limited. While studies have confirmed notable benefits of using GenAI techniques, such as improving performance in practical scenarios through adaptive learning systems (Mello et al., 2023) and enhancing individual engagement and knowledge retention via hyper-personalized training and adaptive skill development by tailoring educational content and feedback to individual needs (Dogru et al., 2023), pedagogical and ethical challenges impose critical constraints. Over-reliance on smart or automated solutions may undermine the development of analytical and critical skills, as well as independent problem-solving abilities (Zhai et al., 2024; Ivanov & Soliman, 2023; Altun et al., 2024), which are essential for the Tourism industry, while also creating ethical risks related to algorithmic bias and data privacy (Remountakis et al., 2023; Buitrago-Esquinas et al., 2024; Egeli-Çankaya et al., 2024) and producing inaccurate or distorted representations of authentic cultural heritage (Spennemann, 2024). Longitudinal findings highlight competency gaps in areas requiring careful value judgment, underscoring the need for integrative models that position AI as a support rather than a substitute for traditional education, to ensure the preparation of well-rounded Tourism professionals capable of balancing technical competence with ethical sensitivity in complex digital environments.

Methodology

This study employed a descriptive, cross-sectional survey design to examine undergraduate students' perceptions of the benefits and challenges of using GenAI technologies in Tourism Management. The researchers developed a reliable instrument to collect data on tourism undergraduates' perceptions regarding the benefits (or lack thereof) of using GenAI technologies to enhance competencies in the Tourism industry, as well as the challenges encountered when using them as a learning tool. The study was conducted during the second week of the second semester of the 2024–2025 academic year, with data gathered through an online survey. Prior to implementation, ethical approval was obtained from the Institutional Review Board (IRB; Decision No: 379/2025) at the University of Jordan. In addition, informed consent was secured from participants, who were fully briefed on the study's purpose, procedures, and their right to withdraw at any stage.

Study Population and Sample

The research population consisted of all undergraduate students enrolled in the bachelor's programs of Tourism Management at the Schools of Archaeology and Tourism in public universities in Jordan. Specifically, this included students in their second, third, or fourth year, as well as those registered during the second semester of the 2024–2025 academic year. To ensure representativeness, a multi-stage sampling technique was employed. In the first stage, three public universities offering a Bachelor's degree in Tourism Management were randomly selected from the total number of eligible universities: the University of Jordan (UJ), Yarmouk University (YU), and the Hashemite University (HU). These institutions represent the central, northern, and southern regions of Jordan. In the second stage, purposive sampling was applied based on specific criteria: students who had used one or more GenAI tools as a learning aid in their Tourism courses for more than four months, and students who had completed more than seven specialized courses in Tourism Management. The questionnaire was distributed to all students who met the inclusion criteria in the three selected universities. The final sample, however, consisted only of those who voluntarily responded to the survey and satisfied the defined criteria. Consequently, while the sample was stratified at the university level, representation within each university may have been limited due to varying response rates.

Purposive sampling is an appropriate technique for targeting a specific group, such as undergraduate students with experience using GenAI technologies (Tongco, 2007). The study sample consisted of 259 undergraduate students, a number deemed sufficient for the descriptive nature of the analysis, which focused on means and standard deviations rather than inferential statistics. The sample size was determined using Thomson's equation (Thompson, 2012). Table 1 presents the demographic profile of the participants.

Table 1

Demographic Data of Participants (N = 259)

No.	Variable	Value	f	%
1	Gender	Male	110	42.5
		Female	149	57.5
2	University	UJ (Amman)	123	47.5
		UJ (Aqaba)	90	34.7
		HU	21	8.1
		YU	25	9.7
3	Academic Year	Second	69	26.6
		Third	79	30.5
		Fourth	111	42.9
4	GPA	Excellent	34	13.1
		Very good	96	37.1
		Good	97	37.5
		Poor or less	32	12.4
5	Digital Skills Level	Beginner	40	15.4
		Intermediate	174	67.2
		Advanced	45	17.4
	Total		259	100

*F: Frequency, P: Percentage

The Study Instrument

The study instrument was designed and developed by the researchers to collect data on undergraduate students' perceptions of the role GenAI tools play in developing their Tourism Management competencies, along with the challenges they encountered when using these tools in the learning process. A structured online questionnaire consisting of 48 items was employed,

divided into three sections. The first section contained four questions gathering demographic data about the participants, including gender, GPA, academic year, and digital skills.

The second section focused on the perceived benefits of using GenAI tools to support Tourism Management competencies, measured using the PB-TMC Scale. The PB-TMC is based on the SCD Model (Sandwith, 1993) and aligned with Tourism competencies scales and related literature (Zimik & Barman, 2024; Shariff & Abidin, 2014; Shariff & Abidin, 2015; Wakelin-Theron et al., 2018). It comprised 37 items distributed across the five domains of the SCD Model: (1) the "conceptual competencies" subscale (PB-C), which included 9 items; (2) the "leadership" subscale (PB-L), with 7 items; (3) the "interpersonal" subscale (PB-I), with 6 items; (4) the "administrative" subscale (PB-A); and (5) the "technical" subscale (PB-T), with 9 items. These items assessed undergraduate perceptions of the benefits GenAI tools provide in supporting their TMC. Respondents rated the usefulness of GenAI tools for supporting their TMC on a 5-point Likert scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). The possible total score ranged from 37 to 185, with higher scores indicating a greater perception that GenAI tools support TMC.

The third section included the Perceived Challenges (PC) Scale, developed to assess the challenges undergraduate students encounter when using GenAI tools for academic purposes, drawing on measures reported in previous studies (Ajlouni et al., 2023; Ibrahim & Ajlouni, 2024). The PC Scale consisted of nine items, with respondents rating perceived challenges in their use of GenAI tools on a 5-point Likert scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). The possible total score ranged from 9 to 45, with higher scores indicating that students perceived more challenges when using GenAI tools.

The content validity of the PB-TMC and PC scales was established by a panel of 12 experts specializing in Hospitality and Tourism, Educational Psychology, Educational Technology, and Measurement and Evaluation. Internal validity and reliability were assessed through a pilot study (n = 35), with participants randomly selected from the study population but excluded from the final sample. Pearson's correlation coefficients (r) between each item of the PB-TMC scale and the overall PB-TMC scale ranged from 0.72 to 0.82. Similarly, r values for each item of the PC scale

and the overall PC scale ranged from 0.41 to 0.764. All correlations were statistically significant at $p < 0.05$.

Additionally, Cronbach's alpha coefficients were calculated for the PB-TMC and PC scales, yielding scores of 0.982 and 0.88, respectively, indicating that both were within an appropriate range. These results confirm that the scales demonstrated a very high degree of internal consistency and reliability. The strong reliability metrics provide confidence that the instrument was appropriate for measuring the intended constructs in this study.

Data Collection

The data were collected using an online survey created and administered via Google Forms. The questionnaire was disseminated to the targeted purposive sample of undergraduate students through official university channels. This process involved coordination with course instructors and administrative staff to distribute the survey link via university email lists and dedicated learning management systems (LMS)—such as Moodle and Microsoft Teams—to ensure it reached eligible students enrolled in Tourism Management programs at the University of Jordan (UJ), Yarmouk University (YU), and the Hashemite University (HU). Only students who met the inclusion criteria were targeted. All responses were screened to ensure they met the required conditions before being included in the analysis. Accordingly, the final sample size of 259 students reflects only those who completed the questionnaire correctly and satisfied the study's criteria.
 For data processing, all responses were coded and entered into SPSS, where the data were checked for completeness and accuracy prior to conducting the descriptive statistical analysis.

Data Analysis

The study utilized SPSS software to analyze the data using descriptive statistics, including means and standard deviations, for each questionnaire item to assess responses. The means reflected the extent to which undergraduate students perceived GenAI tools as enhancing their competencies, as well as the challenges they encountered. In addition, the mean and standard deviation were calculated for each competency domain (conceptual, leadership, administrative, interpersonal, and technical) to evaluate overall performance across subdomains.

Results and Discussions

SQ1: To what extent do undergraduate Tourism Management students perceive GenAI technologies as beneficial for supporting competencies based on Sandwith's Model?

To address the first study question, descriptive statistics for participant responses using the PB-TMC subscales were computed.

Conceptual and creative competencies in Tourism education: The conceptual and creative competencies subscale examines how students perceive GenAI as a tool to enrich conceptual and creative competencies in Tourism education. See Table 3 for descriptive statistics of the PB-C subscale. Findings indicate that undergraduate students enrolled in Tourism Management courses generally perceive GenAI technologies as valuable tools for enhancing conceptual and creative competencies relevant to the tourism sector.

Study data confirm that the highest-rated score within the PB-C domain is Item 4 (M = 4.14), which indicates students strongly agree that GenAI techniques contribute to developing innovative ideas for tourism destination management strategies, with more than 84% of respondents expressing agreement. The second highest rating is Item 6 (M = 4.13), showing that students believe GenAI technologies provide up-to-date analysis and information that enhance understanding of global trends in the tourism sector, with more than 83% in agreement. This reinforces the notion that GenAI technologies go beyond mere content generation, functioning as sophisticated analytical mechanisms capable of supporting advanced cognitive processes, including pattern recognition, trend analysis, and evidence-based reasoning (Keiper et al., 2023; Alasadi & Baiz, 2023). Moreover, the role of GenAI techniques in developing innovative ideas for destination management strategies is increasing, indicating that AI technologies facilitate creativity and strategic innovation within a variety of tourism contexts. These results align with Symeou et al. (2025), Guettala et al. (2024), and García-Peñalvo & Vázquez-Ingelmo (2023), who describe GenAI as a transformative educational technology that encourages innovation, creativity, idea generation, and personalized learning experiences. In addition, AI-powered idea and solution generation corresponds with pedagogical frameworks that prioritize learner initiative and innovation (Egeli-Çankaya et al., 2024; Roe & Perkins, 2024).

 Item 5 findings confirm that respondents agree GenAI techniques contribute to developing a comprehensive understanding of the global tourism system and its connections between cultural and economic factors (M = 4.09), with more than 79% agreement. By using deep learning models to generate new content in various formats such as text, images, and simulations, GenAI helps students engage in tasks that reflect complex real-world challenges in tourism (Egeli-Çankaya et al., 2024). GenAI also facilitates the understanding of cultural and economic factors through adaptive simulations and personalized content. These interactive and immersive capabilities foster creativity and contribute to strengthening students' understanding of cultural and economic dynamics within global tourism systems (Cassani et al., 2024; Pratisto et al., 2022).

Item 8 received the lowest rating (M = 3.99), with more than 70% of respondents agreeing that GenAI techniques provide practical tools to analyze data and generate insights that support informed decision-making. By enabling students to interpret data and produce evidence-based insights, GenAI enhances their capacity to make strategic decisions in both academic and professional contexts (Khosravi et al., 2025).

The majority of students agreed that GenAI technologies support their understanding of the tourism industry by helping them identify and optimize processes, analyze complex tourism issues, enhance their ability to plan and organize tasks, and generate innovative ideas for designing tourism products and programs, in addition to targeting new markets, as reflected in the responses for this subscale. These findings align with previous studies confirming the strong potential of GenAI technologies in the context of tourism education (Dogru et al., 2023b; Dwivedi et al., 2024). However, other studies caution against over-reliance on GenAI tools, as this may hinder the development of critical thinking skills and independent thought in the absence of appropriate pedagogical guidance (Jose et al., 2024; Szmyd & Mitera, 2024; Ahmad et al., 2023; Krullaars et al., 2023; Zhai et al., 2024; Ivanov & Soliman, 2023; Altun et al., 2024). These findings highlight the importance of conducting further research to explore such consequences. Therefore, it is imperative for educators to implement structured AI literacy programs and establish clear ethical frameworks, as emphasized by recent studies (Ng et al., 2021; Noroozi et al., 2024), to ensure the positive and balanced use of these innovative technologies.

 Additionally, the overall mean score across the nine items on the PB-C subscale was 4.07, indicating a high level of agreement among students. This reflects a broader transformation

occurring in higher education and supports previous studies that confirm approved AI tools help reshape traditional curricula while equipping students with critical creative tools that empower success in innovation-focused sectors, such as the rapidly evolving tourism industry (Egeli-Çankaya et al., 2024; Dwivedi et al., 2024). Overall, these findings confirm that students perceive GenAI as highly beneficial in enhancing conceptual and creative competencies.

Table 2

Descriptive Statistics for Response Data for Undergraduate TMSs on the PB-C Subscale

No.	Statements	SD %(f)	D %(f)	N %(f)	A %(f)	SA %(f)	M ± SD
1.	GenAI techniques help me understand the Tourism industry in general.	1 0.39%	8 3.09%	38 14.67%	133 51.35%	79 30.50%	4.09 ± 0.78
2.	GenAI techniques help me identify and optimize processes that are important for the Tourism industry.	1 0.39%	9 3.47%	40 15.44%	141 54.44%	68 26.25%	4.03± 0.78
3.	GenAI techniques help me analyze complex tourism issues faster and more effectively.	1 0.39%	6 2.32%	46 17.76%	127 49.03%	79 30.50%	4.07± 0.77
4.	GenAI techniques support me in developing innovative ideas for destination management strategies.	1 0.39%	7 2.70%	33 12.74%	133 50.58%	87 33.59%	4.14± 0.80
5.	GenAI techniques help me to develop a comprehensive understanding of the global Tourism system and connect cultural and economic factors.	1 0.39%	6 2.32%	47 18.15%	120 46.33%	85 32.82%	4.09± 0.80
6.	GenAI techniques provide up-to-date analytics and information and help me to understand global trends in the Tourism industry.	2 (0.77%)	4 1.54%	37 14.29%	130 50.19%	86 33.20%	4.13 ± 0.79
7.	GenAI techniques enhance my ability to plan and organize tasks related to Tourism Management.	2 (0.77%)	8 (3.09%)	41 (15.83%)	134 (51.74%)	74 (28.57%)	4.04 ± 0.78
8.	GenAI techniques provide me with practical tools to analyze data, and insights for informed decision-making.	2 (0.77%)	6 2.32%	57 (22.01%)	122 (47.10%)	42 (16.22%)	3.99 ± 0.79
9.	GenAI techniques provide me with innovative ideas for designing Tourism products and programs targeting new markets.	1 0.39%	8 3.09%	42 (16.22%)	125 (48.26%)	83 (32.05%)	4.08 ± 0.80
	Total						4.07± 0.79

Leadership competencies in tourism education: The leadership competencies subscale examines how students perceive GenAI as supporting leadership competencies in Tourism

education. Table 3 presents descriptive statistics for the PB-L subscale. Results suggest that undergraduate students in Tourism Management programs generally view GenAI technologies as effective tools for supporting their leadership skills in the tourism industry. Item 1 has the highest mean score for all items within this domain (M = 4.08), with more than 79% of students agreeing, indicating that they strongly perceive GenAI as a tool that supports leadership development, particularly by providing practical and applicable scenarios to enhance their understanding of team management in tourism contexts. Items 2 and 4 reported the second highest mean (M = 4.05), confirming strong student perceptions of GenAI's value in strategic crisis management and trust-building within teams. These responses show that students perceive GenAI both as an information retrieval tool and as a strategic means to simulate real-world leadership scenarios. Findings demonstrate that GenAI techniques can provide contextual simulations and personalized recommendations to help students develop practical and strategic decision-making skills (García-Peñalvo, 2024; Zawacki-Richter et al., 2024; Guettala et al., 2024).

 Responses to Items 3 and 5 indicate strong agreement (M = 4.02), highlighting the role of GenAI in enhancing communication strategies with teams and stakeholders, particularly in motivating team members to achieve goals efficiently. These skills are essential in the tourism and hospitality sectors, where leadership is often exercised in dynamic, multicultural, and high-risk environments. This supports the argument that GenAI, through adaptive content generation and role-playing scenarios (Mollick et al., 2024), can facilitate the practice of soft skills critical to leadership, such as negotiation, motivation, and the development of emotional intelligence (Yang et al., 2024; Bhowmick et al., 2024). In addition, more than 77% of respondents agreed that GenAI techniques contribute to strengthening their ability to make strategic decisions based on accurate data and analysis, as reported in Item 6. This corroborates that the capabilities of AI-driven technologies provide immediate, context-sensitive support, facilitating efficient decision-making in academic and administrative contexts (García-Peñalvo, 2024) and enhancing students' ability to analyze complex data to make informed strategic decisions (García-Peñalvo, 2024; Zawacki-Richter et al., 2024; Guettala et al., 2024).

 The lowest-rated item on this subscale was Item 7 (M = 3.98); 73% of respondents agreed that GenAI techniques provide them with insights to enhance their commitment to ethical and professional values in the tourism work environment. This finding suggests a degree of skepticism

or caution regarding the reliability of AI-generated content in ethically sensitive or high-impact situations. Such concerns are consistent with previous studies that highlight issues such as AI bias, misinformation, and ethical implications as significant barriers to trust and widespread adoption (Simms, 2025; Alali & Wardat, 2024; Topaz et al., 2024; De Gagne et al., 2023; Williamson et al., 2020). This cautious stance is justified in light of warnings from earlier studies about the risks of overreliance on AI technologies and the potential erosion of critical thinking and self-learning capabilities (Zhai et al., 2024; Ivanov & Soliman, 2023; Altun et al., 2024; Jose et al., 2024; Szmyd & Mitera, 2024; Ahmad et al., 2023; Krullaars et al., 2023). Students may fear that reliance on GenAI tools could foster dependency, leading them to prioritize immediate efficiency over deeper, reflective learning processes. This insight underscores the importance of developing structured AI literacy programs that enable students to understand how GenAI tools function and use them effectively, while simultaneously strengthening their critical evaluation skills, ability to verify the reliability of outputs, and capacity to apply them within ethical frameworks tailored to the specific contexts of their academic disciplines (Ng et al., 2021).

The overall mean for this subscale was (M = 4.03), indicating that students perceive GenAI as highly beneficial for leadership development, particularly in decision-making, initiative, critical thinking, and problem-solving.

Table 3

Descriptive statistics of Response Data for undergraduate TMSs on the PB-L Subscale

No.	Statements	SD %(f)	D %(f)	N %(f)	A %(f)	SA %(f)	M ± SD
1.	GenAI techniques help me improve my leadership skills, such as providing practical examples of team management.	1 (0.39%)	7 (2.70%)	46 (17.76%)	122 (47.10%)	83 (32.05%)	4.08 ± 0.80
2.	GenAI techniques provide me with strategic advice to efficiently manage Tourism crises.	1 (0.39%)	7 (2.70%)	50 (17.76%)	122 (47.10%)	79 (30.50%)	4.05 ± 0.80
3.	GenAI techniques help me to develop effective communication strategies within teams and with stakeholders.	2 (0.77%)	9 (3.5%)	50 (17.76%)	119 (45.95%)	79 (30.50%)	4.02 ± 0.84

#	Statement	1	2	3	4	5	Mean ± SD
4.	GenAI techniques provide me with guidance on how to foster trust within the Tourism team.	1 (0.39%)	10 (3.86%)	45 (17.37%)	123 (47.49%)	80 (30.89%)	4.05 ± 0.82
5.	GenAI techniques offer me ideas to motivate tourism team members and assists with achieving goals efficiently.	3 1.16%	10 (3.86%)	42 16.22%	128 49.42%	76 29.34%	4.02 ± 0.84
6.	GenAI techniques contribute to strengthening my ability to make strategic decisions based on accurate data and analysis.	4 1.54%	10 (3.86%)	44 16.99%	122 (47.10%)	79 (30.50%)	4.01 ± 0.88
7.	GenAI techniques provide me with insights to enhance my commitment to ethical and professional values in the Tourism work environment.	3 1.16%	11 4.25%	54 20.85%	112 43.24%	79 (30.50%)	3.98 ± 0.89
						Total	4.03± 0.84

Interpersonal competencies in Tourism education: The Interpersonal Competencies subscale examines how students perceive the role of GenAI in supporting interpersonal skills within Tourism education; Table 4 presents descriptive statistics for the PB-I subscale. Results suggest that undergraduate students in Tourism Management programs generally regard GenAI technologies as effective tools for enhancing their interpersonal skills relevant to Tourism education. Item 2 recorded the highest score within this subscale (M = 4.04), with more than 77% of respondents agreeing; this reflects a strong consensus on the role of GenAI in enhancing students' understanding of cultural diversity and respecting differences between cultures, which is increasingly important in the globalized Tourism sector. This suggests that AI tools are perceived as effective mechanisms for promoting cultural awareness by simulating diverse interactions and providing examples of culturally appropriate communication. This finding aligns with other studies that highlight the transformative potential of GenAI to foster cultural awareness and socially responsive learning. Nyaaba et al. (2024) demonstrates how GenAI supports culturally responsive curricula and interactive simulations, helping learners understand and appreciate cultural diversity, which is one of the core competencies in international Tourism education.

Item 1, which relates to how GenAI helps students improve their written and verbal communication with international clients and colleagues, was the next highest (M = 4.03), with more than 78% of respondents agreeing. This suggests that students find GenAI effective for refining language skills and enhancing clarity in multicultural professional settings, an essential competency in the global tourism industry. These results support prior studies by Creely (2024) and Mello et al. (2023), which demonstrate that AI-driven tools such as chatbots and virtual

teaching assistants can provide interactive language practice and real-time feedback, thereby enhancing learners' ability to communicate effectively across linguistic and cultural boundaries.

Items 3, 4, and 6 achieved the same mean score (M = 3.97), with more than 74% of students in agreement, indicating that GenAI techniques support them in improving their persuasion and negotiation skills with clients and suppliers. Findings related to building sustainable professional relationships and improving teamwork and collaboration in a multicultural environment demonstrate that students have comparable levels of confidence regarding GenAI's contribution to these specific skill areas (Wang & Kim, 2025).

Item 5 is the lowest-rated item (M = 3.93), with more than 74% of respondents agreeing that GenAI techniques contribute to strengthening their ability to effectively manage conflict within tourism teams.   This reflects student confidence that interacting with GenAI positively impacts their capacity to handle team dynamics, negotiate differences, and maintain professional relationships in diverse work environments. These findings align with recent research, such as Shaikh et al. (2024), which showed that GenAI-based conflict simulation and feedback systems, such as "Rehearsal," which employs large language models to simulate conflict scenarios, can significantly improve conflict resolution strategies, double cooperative responses, and reduce aggressive tactics. Aref (2024) further demonstrates that integrating GenAI into team-based project learning enhances student awareness of conflict triggers and provides structured strategies for resolving disputes in multicultural teams.

The overall mean for this domain was (M = 3.99), indicating that students perceive GenAI as moderately to highly beneficial in developing communication skills, cultural competence, negotiation, teamwork, and conflict resolution—competencies essential in the tourism and hospitality industries.

Table 4

Descriptive Statistics of Response Data for Undergraduate TMS's on the PB-I Subscale

No.	Statements	SD %(f)	D %(f)	N %(f)	A %(f)	SA %(f)	M ± SD
1.	GenAI techniques support me in improving my written and verbal communication skills with international clients and colleagues.	2 (0.77%)	15 (5.79%)	38 (14.67%)	121 (46.72%)	83 (32.05%)	4.03± 0.88
2.	GenAI techniques help me to understand cultural diversity and respect differences between different cultures.	2 (0.77%)	15 (5.79%)	41 15.83%	114 44.02%	87 33.59%	4.04 ± 0.89
3.	GenAI techniques support me in improving my persuasive and negotiation skills with clients and suppliers.	2 (0.77%)	13 5.02%	52 20.08%	115 44.4%	77 29.73%	3.97 ± 0.88
4.	GenAI techniques provide me with advice on how to build sustainable professional relationships in the Tourism work environment.	1 0.39%	16 6.18%	43 16.6%	128 49.42%	71 27.41%	3.97 ± 0.85
5.	GenAI techniques contribute to strengthening my ability to effectively manage conflicts within tourism teams.	1 0.39%	16 6.18%	55 21.24%	115 44.4%	72 27.8%	3.93± 0.88
6.	GenAI techniques support me in improving my teamwork and collaboration skills in a multicultural environment.	3 1.16%	12 4.63%	51 19.69%	118 45.56%	75 28.96%	3.97± 088
	Total						**3.99± 0.88**

Administrative competencies in tourism education: The Administrative Competencies subscale examines how students perceive the role of GenAI in supporting administrative competencies within tourism education; Table 5 presents the descriptive statistics for the PB-A subscale. Results suggest that, overall, undergraduate students in Tourism Management programs regard GenAI technologies as effective tools for enhancing their administrative competencies relevant to Tourism education. Item 3 recorded the highest mean (M = 4.10), with more than 80% of respondents agreeing that GenAI techniques support them in managing their time efficiently by providing prompt and direct answers to academic questions. This reflects a clear perception of the effectiveness of GenAI tools in reducing the time students spend searching for information or clarifying academic content (Kasneci et al., 2023). Such efficiency is likely to contribute positively

to the learning process and time management, especially in fast-paced academic environments (Zhai, 2022).

Items 1 and 2 received the same overall mean score (M = 4.06), with more than 77% of respondents agreeing that GenAI techniques help them understand administrative policies and procedures, while also providing valuable tools to develop effective operational plans and improve organizational efficiency. These results reflect student awareness of GenAI's potential for building professional skills through advanced interactive and analytical tools. These perceptions align with recent literature highlighting the role of GenAI in enhancing core competencies increasingly important in Tourism education, including strategic planning, operational analysis, and managerial oversight (Zafar & Ali, 2025). Item 4 also recorded a high mean score (M = 4.05), with 78% of respondents agreeing that GenAI techniques help them evaluate the performance of administrative processes and teams within tourism organizations. This indicates that students recognize the potential of GenAI not only as an academic support tool but also as a resource for understanding and evaluating operational efficiency in real-world tourism settings (Egeli-Çankaya et al., 2024).

Similarly, Item 6 received a high mean score (M = 4.01), with students agreeing that GenAI techniques contribute to improving administrative skills to ensure a high-quality tourism experience for clients. These findings reinforce previous studies confirming that GenAI tools support administrative tasks such as scheduling, communication, and data management in tourism environments, resulting in more efficient operations and improved customer satisfaction (Doğan & Niyet, 2024). Furthermore, educational studies affirm that integrating GenAI into tourism curricula assists students in developing practical managerial competencies aligned with the sector's needs (Kasneci et al., 2023). By contrast, Item 5, which relates to financial planning, received the lowest rating among the six items in this subscale (M = 3.99). Nevertheless, the result still indicates a high level of perceived usefulness for GenAI technologies in Tourism education, with more than 75% of respondents agreeing. These findings may highlight a beneficial role for GenAI technologies in guiding students to analyze budget-related data, address financial issues, and monitor expenses efficiently in the tourism industry, thereby significantly contributing to the development of financial management skills, which are essential for effective Tourism Management (Awasthi, 2023). Based on these responses, study findings regarding the Administrative Subscale reveal that undergraduate Tourism Management students generally

perceive GenAI as a valuable tool that enhances various aspects of administrative learning and practice. The overall mean (M = 4.04) indicates that students perceive GenAI as highly beneficial in fostering professional competencies, particularly in time management, policy interpretation, and operational planning. These results align with a growing body of literature emphasizing GenAI's role in redefining higher education through task automation, adaptive content generation, and personalized learning (Su & Yang, 2022; Alasadi & Baiz, 2023).

Table 5

Descriptive Statistics for Response Data for Undergraduate TMSs on the PB-A Subscale

No.	Statements	SD %(f)	D %(f)	N %(f)	A %(f)	SA %(f)	M ± SD
1.	GenAI techniques help me understand administrative policies and procedures related to Tourism.	3 1.16%	7 2.70%	48 18.53%	115 44.4%	86 33.20%	4.06± 0.85
2.	GenAI techniques offer me valuable tools to develop effective operational plans and improve organizational efficiency.	2 (0.77%)	9 3.47%	42 16.22%	127 49.03%	80 30.89%	4.06± 0.82
3.	GenAI techniques support me in managing my time efficiently by providing prompt and direct answers to my academic questions.	3 1.16%	6 2.32%	34 13.13%	135 52.12%	81 31.27%	4.10± 0.79
4.	GenAI techniques help me to evaluate the performance of administrative processes and teams within tourism organizations.	2 (0.77%)	7 (2.70%)	45 (17.37%)	126 48.65%	79 (30.5%)	4.05± 0.81
5.	GenAI techniques provide me with advice on how to analyze budgets and monitor tourism expenses efficiently.	1 0.39%	11 4.25%	52 20.08%	121 46.62%	74 28.57%	3.99± 0.83
6.	GenAI techniques contribute to improving my administrative skills in order to ensure a high-quality tourism experience for clients.	1 0.39%	13 (5.02%)	47 18.15%	120 46.33%	78 30.1%	4.01± 0.85
	Total						4.04± 0.82

Technical competencies in tourism education: The Technical Competencies subscale examines how students perceive the role of GenAI in supporting technical competencies within Tourism education; Table 6 presents the descriptive statistics for the PB-T subscale. Study results suggest that undergraduate students in Tourism Management programs generally regard GenAI technologies as effective tools for enhancing technical competencies relevant to Tourism education. Items 3 and 5 received the highest mean scores, with more than 70% of respondents agreeing that creating digital marketing content and designing tourism programs tailored to various

groups met their needs; both recorded a mean of (M = 4.08). These results indicate that students recognize the potential of GenAI to enhance creativity, personalization, and efficiency in tourism planning and promotion. As demonstrated by Zhang and Prebensen (2024), GenAI applications assist in creating tourism marketing materials and promote a co-creation relationship between generative AI and tourism marketers.

Item 2 was the next highest (M = 4.07), with more than 80% of respondents agreeing that GenAI technologies contribute insights for developing innovative marketing plans that appeal to tourists. These findings align with previous studies indicating that GenAI enhances the development of creative and market-oriented skills among Tourism students (Egeli-Çankaya et al., 2024; Dwivedi et al., 2024). The integration of GenAI tools into the curriculum allows students to simulate real-world tasks such as content creation, promotional planning, and customer segmentation—skills highly valued in the contemporary Tourism labor market. Item 8, with a mean score of (M = 4.06), also indicates strong student endorsement of GenAI's role in enhancing their understanding of destination management applications, with more than 80% of respondents agreeing. This suggests that students perceive AI as a valuable learning tool that facilitates their grasp of complex concepts related to tourism destination planning, development, and sustainability. It supports the view that AI functions not only as a content generator but also as a strategic learning tool, enabling students to engage with real-world challenges and solutions in tourism destination management through simulations, scenario-based inquiries, and data interpretation. Yaşaret et al. (2025) highlight that ChatGPT supports smart tourism destination planning by addressing digital infrastructure, AR/VR, and cultural heritage, while also promoting community engagement, education, and security, thereby offering a comprehensive framework for sustainable tourism development.

Items 1 and 7, with an average response score of (M = 4.05) and more than 75% of respondents in agreement, highlight the significant role GenAI technologies play in enhancing educational competence through interaction with digital systems, particularly in the context of Global Distribution Systems (GDS software) used in the tourism sector, and in understanding data protection principles. The results reveal a notable improvement in students' understanding of online booking applications (such as Amadeus and Sabre) and data protection practices within digital tourism environments. These findings show the effectiveness of GenAI in simulating real operational scenarios and fostering digital fluency through interactive exercises. Furthermore, they

support student awareness of the importance of ethical and technical considerations when managing sensitive customer and organizational data, which is increasingly critical in the Tourism and Hospitality sectors as services transition to digital platforms. Moreover, results confirm significant agreement on the role GenAI technologies play in enhancing understanding of customer data protection principles and regulatory compliance, as reflected in Item 7, indicating a growing awareness of the ethical dimensions associated with digital transformation in tourism. These findings align with current academic trends emphasizing the importance of integrating AI ethics and data governance frameworks into educational curricula to ensure the responsible use of these technologies in accordance with global standards (Batista et al., 2024; De Gagne et al., 2023; Topaz et al., 2024). This trend highlights the need to promote comprehensive education that integrates technical skills with social responsibility in the context of the digital tourism sector. Both Items 6 and 9 recorded the same mean score (M = 4.04), indicating that these tools contribute to improving the quality of tourism services, optimizing customer communication through e-booking software, and enhancing service-related functions in the tourism industry. This suggests that students are aware of the practical benefits of AI in tourism, including more efficient customer interactions, faster booking processes, and improved service delivery. Overall, the findings confirm the perceived value of AI in raising service standards and operational efficiency within the tourism sector. In addition, emerging digital technologies address the growing demand for personalized travel experiences. Intelligent chatbots and other GenAI tools are helping to transform tourism and travel-related services by offering interactive guidance for both tourism providers and travelers (Ilieva et al., 2024).

Item 4 reported the lowest mean score (M = 4.03), with more than 80% of students agreeing that GenAI technologies provide valuable tools for analyzing market data and identifying opportunities in the tourism sector. This reflects students' recognition of GenAI's role in enhancing their ability to process market information and identify business opportunities (Carvalho & Ivanov, 2023). Similarly, Sop et al. (2024) investigated a more specific issue related to ChatGPT, focusing on its application in data analytics and market intelligence.

The results of the technical subscale indicate that undergraduate students in Tourism Management programs generally recognize the distinct benefits of GenAI applications in developing their specialized technical skills. All items in this domain received high mean scores above 4.06, with

agreement percentages exceeding 79% in most cases, reflecting strong positive perceptions of GenAI's usefulness across various tourism-related competencies. In summary, students perceive GenAI as highly beneficial in strengthening technical skills.

Table 6

Descriptive Statistics of Response Data for Undergraduate TMSs on the PB-T Subscale

No.	Statements	SD %(f)	D %(f)	N %(f)	A %(f)	SA %(f)	M ± SD
1.	GenAI techniques help me understand how to use e-booking systems (GDS Software) and their applications (e.g., Amadeus, Sabre).	4 1.54%	10 3.86%	37 14.29%	126 48.65%	82 31.66%	4.05± 0.86
2.	GenAI techniques provide me with insights on how to develop innovative marketing plans to attract tourists.	1 0.39%	8 3.09%	41 15.83%	131 50.58%	78 30.1%	4.07± 0.78
3.	GenAI techniques help me create digital marketing content, including blogs, promotional videos, and social media posts.	3 1.16%	6 2.32%	41 15.83%	127 49.03%	82 31.66%	4.08± 0.82
4.	GenAI techniques provide me with tools to analyze market data and identify opportunities in the Tourism sector.	3 1.16%	6 2.32%	44 16.99%	133 51.35%	73 28.19%	4.03± 0.80
5.	GenAI techniques help me design tourism programs that suit different groups and needs.	1 0.39%	7 2.70%	38 14.65%	138 53.33%	75 28.91%	4.08± 0.76
6.	GenAI techniques support me to improve the quality of Tourism services provided by means of practical ideas and suggestions.	1 0.39%	10 3.86%	37 14.29%	141 54.42%	70 27.02%	4.04± 0.57
7.	GenAI techniques help me understand the principles of protecting customer and organizational data in digital tourism.	1 0.39%	8 3.09%	45 17.35%	128 49.42%	77 29.73%	4.05± 0.79
8.	GenAI techniques provide me with examples of how AI can be used to improve destination management.	1 0.39%	10 3.86%	38 14.65%	133 51.35%	77 29.73%	4.06± 0.79
9.	GenAI techniques help me to optimize customer communication processes on e-booking platforms.	1 0.39%	11 4.25%	44 16.99%	123 47.48%	80 30.89%	4.04± 0.82
	Total						4.06± 0.71

Based on the findings for all data subsets related to SQ1, the benefits of using GenAI in Tourism education are substantial. Across all five competency domains, students perceived GenAI as highly beneficial for supporting their learning and skill development. These results align with research recommendations advocating for the integration of AI training programs and academic support

mechanisms into Tourism curricula, as well as with recent academic literature in other contexts (Guettala et al., 2024; Ng et al., 2021). However, as AI becomes more deeply embedded in Tourism education, researchers caution against overreliance on these technologies, as it may hinder the development of independent problem-solving and critical thinking skills (Zhai et al., 2024; Ivanov & Soliman, 2023; Altun et al., 2024). Moreover, this enthusiasm must be tempered by ethical considerations, including algorithmic bias, data privacy, and the accuracy of cultural representations (Alali & Wardat, 2024; Noroozi et al., 2024; Wood & Moss, 2024). Therefore, the extent to which students perceive GenAI as beneficial can be described as consistently high across all competency domains, highlighting the need for strong ethical frameworks, critical engagement, and human oversight to ensure responsible innovation.

SQ2: What challenges do undergraduate Tourism Management students report when using GenAI technologies as learning tools?

The mean (M), standard deviation (SD), F-value, and p-value from participant responses on the PC scale were computed to address the second research question.

Table 7 presents the descriptive statistics regarding how undergraduate Tourism Management students perceive challenges when using GenAI technologies in their learning. The most prominent challenge was poor internet connectivity, with more than 76% of respondents agreeing that it negatively affected their use of GenAI tools (M = 4.08). The second major challenge was difficulty in verifying the validity of AI-generated content (M = 3.81). Additionally, over 70% of students agreed that certain specialized tourism topics were not adequately covered by GenAI technologies (M = 3.78). In contrast, lower levels of agreement were reported for concerns about overdependence on GenAI affecting students' critical thinking skills (M = 3.32) and for a lack of digital skills (M = 3.37), with fewer than 42% of respondents agreeing with either of these items. The overall mean score across all items was 3.63, suggesting a moderate level of perceived challenges in utilizing GenAI tools for Tourism-related learning.

Table 7

Descriptive Statistics of Response Data for Undergraduate TMSs on the PC scale

No.	Statements	SD %(f)	D %(f)	N %(f)	A %(f)	SA %(f)	M ± SD
1.	I have poor internet connection that negatively impacts my ability to use GenAI technologies.	2 (0.8%)	21 (8.1%)	38 (14.7%)	92 (35.5%)	106 (40.9%)	4.08 ± 0.97
2.	I face difficulties in verifying the validity of data generated by GenAI technologies	5 (1.9%)	21 (8.1%)	72 (27.8%)	82 (31.7%)	79 (30.5%)	3.81 ± 1.02
3.	I am concerned about my critical development skills because I have become overly dependent on GenAI technologies for the learning process.	20 (7.7%)	41 (15.8%)	82 (31.7%)	68 (26.3%)	48 (18.5%)	3.32 ± 1.17
4.	I face difficulties when aligning a response provided by GenAI technologies within a Jordanian Tourism context.	9 (3.5%)	32 (12.4%)	72 (27.8%)	91 (35.1%)	55 (21.2%)	3.58 ± .06
5.	I have security and privacy concerns regarding data sharing with GenAI technologies.	12 (4.6%)	27 (10.4%)	64 (24.7%)	85 (32.8%)	71 (27.4%)	3.68 ± 1.12
6.	I lack the required digital skills to use GenAI technologies efficiently.	19 (7.3%)	42 (16.2%)	66 (25.5%)	88 (34.0%)	44 (17.0%)	3.37 ± 1.16
7.	I lack knowledge about the ethical and legal implications of using GenAI technologies which restricts my use of them.	10 (3.9%)	30 (11.6%)	80 (30.9%)	83 (32.0%)	56 (21.6%)	3.56 ± 1.07
8.	I find that some specialized Tourism topics are not adequately covered by GenAI technologies.	6 (2.3%)	19 (7.3%)	69 (26.6%)	98 (37.8%)	67 (25.9%)	3.78 ± 0.99
9.	I feel frustrated by my inability to effectively use GenAI technologies to solve my academic problems.	13 (5.0%)	42 (16.2%)	67 (25.9%)	79 (30.5%)	58 (22.4%)	3.49 ± 1.15
	Total						3.63 ± 0.78

These results highlight the importance of considering the broader educational and infrastructural context when implementing GenAI. The findings show that infrastructural limitations remain a major barrier to student access and effective use of AI tools. This is consistent with Batista et al. (2024), who emphasized the need for digital equity in AI integration across higher education. Moreover, the results point to a critical gap in digital literacy and information evaluation skills, underscoring the need for universities in Jordan to provide workshops and training sessions to strengthen Tourism students' digital competencies. Additionally, the fact that more than 70% of respondents agreed that specialized tourism topics are insufficiently addressed by GenAI tools suggests that current AI models lack the domain-specific capabilities required to fully support

learning in this field—a concern also raised by Altun et al. (2024) regarding tourism-related content. Alternatively, this gap may reflect students' limited ability to formulate effective prompts that generate relevant and accurate AI outputs.

This highlights a pedagogical gap that should be addressed through the integration of AI literacy education within tourism curricula. Furthermore, the distinction between perceived technical limitations and user-related barriers underscores the need for differentiated intervention strategies—focusing both on improving AI system capabilities and on building student competencies.

Concerns about overdependence on AI and digital skill deficiencies were less prominent, suggesting that students largely view GenAI as a supportive supplement rather than a replacement for independent critical thinking or traditional learning methods. These findings align with previous studies that reported moderate challenges faced by undergraduates when using ChatGPT in their learning (Ajlouni et al., 2023; Ibrahim & Ajlouni, 2024). They also reinforce earlier research highlighting student concerns regarding the alignment of ChatGPT-generated information with their major curriculum, as well as delays in ChatGPT's responses (Ibrahim & Ajlouni, 2024; Shoufan, 2023).

Overall, this discussion confirms that while students value GenAI tools, effective integration requires both technological and instructional support. The findings highlight the need for targeted interventions, including strengthening infrastructure, improving students' ability to critically evaluate AI-generated information, and expanding the integration of AI tools with tourism-specific content. Institutions should also provide training and establish clear ethical guidelines to ensure that students use GenAI responsibly and effectively.

Conclusion

This study aims to descriptively examine the role of GenAI in supporting competency development among Tourism Management students in Jordan, guided by the SCDM framework. Its objectives were to assess the perceived benefits of GenAI across the five SCDM domains and to identify the primary challenges students encounter. The findings offer a clear and affirmative response to these aims, underscoring both the considerable potential and the critical considerations involved in integrating GenAI into tourism education.

The results showed that GenAI was perceived as highly effective across all five domains of SCDM, with strong mean scores for conceptual, leadership, interpersonal, administrative, and technical skills. Students emphasized that GenAI improved strategic thinking, decision-making, communication, and technical abilities such as digital marketing and data analysis. These findings demonstrate that GenAI can effectively foster the holistic competency development necessary for future tourism professionals. At the same time, students reported a moderate level of perceived challenges. The most important barriers were infrastructural, particularly poor internet connectivity, as well as difficulties in verifying AI-generated content and the limited availability of localized tourism-specific material. Concerns about overreliance on AI or inadequate digital skills were less pronounced, suggesting that students largely regard GenAI as a supportive resource rather than a substitute for their own critical thinking and creativity.

 Several recommendations emerge from these findings. Educational institutions should formally integrate GenAI into tourism curricula, complemented by training workshops designed to strengthen students' prompt literacy and digital competencies. Universities and policymakers should also prioritize investments in robust digital infrastructure—especially reliable high-speed internet—to ensure equitable access. From a pedagogical perspective, clear ethical guidelines must be established to ensure that GenAI is used to enhance, rather than replace, creativity and critical thinking. Finally, future research should adopt longitudinal designs to examine the long-term effects of GenAI, incorporate qualitative approaches to capture students' lived experiences, and invest in developing localized GenAI datasets tailored to the Jordanian tourism context.

This study is subject to several limitations. The sample size was relatively small and restricted to three universities, which limits the generalizability of the results. Incorporating larger and more diverse samples across multiple universities would yield broader and more representative insights. Moreover, the study employed a descriptive, cross-sectional survey based on self-reported perceptions, which constrains the ability to draw causal inferences. Future research should consider applying inferential or experimental methods to provide deeper insights and stronger evidence regarding the impact of GenAI on competency development.

Implications

This study highlights several important implications. From a theoretical perspective, it demonstrates that integrating GenAI can enhance the development of tourism students'

competencies, while emphasizing the need to balance AI use with human guidance and critical thinking. On a practical level, the findings emphasize the importance of addressing infrastructural barriers and strengthening students' digital literacy, both of which can improve learning outcomes, better prepare graduates for the tourism workforce, and advance progress toward sustainable development goals. At the policy level, universities should develop clear strategies for AI integration in education, supported by investments in reliable digital infrastructure and the establishment of ethical guidelines to ensure equitable and responsible adoption.

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