

Career Sustainability in AI-Driven Tourism: The Mediating Role of Career Adaptability between Grit, Resilience, and Technological Learning Support

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ABSTRACT

Artificial Intelligence (AI) is increasingly exerting a strong influence on the tourism industry, raising many questions and challenges regarding the long-term career sustainability of workers in this industry, the majority of whom are tourism graduates. This study focuses on the relationship between Grit, Resilience, and Technology Learning Support (TLS) and their contribution to Career Sustainability among tourism students in Indonesia, with Career Adaptability as a mediating mechanism. This study used a quantitative approach to analyze the influence of selected variables. Data were collected from final-year tourism students at various universities and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results illustrate that Grit, Resilience, and TLS exert both direct and indirect influences on Career Sustainability, with Career Adaptability emerging as the strongest direct predictor and critical mediating mechanism in the model. All proposed hypotheses, including those addressing direct and mediated relationships, received empirical support. These findings highlight the central role of adaptability in enabling students to translate personal strengths and technology-enabled learning environments into sustainable career outcomes. By integrating psychological resources and technology-oriented learning supports within an AI-driven context, this study offers a meaningful contribution to the career development literature and provides practical insights for educators and curriculum designers seeking to prepare future-ready tourism graduates.

Keywords: Career Sustainability; Career Adaptability; Perseverance; Technology-Based Learning Support; Tourism Education

INTRODUCTION

Education 4.0 embodies a conceptual paradigm that emerges as a response to the demands of the Fourth Industrial Revolution, during which the convergence of human competencies and machine intelligence engenders the development of solutions, addresses complex challenges, and explores innovative pathways. A prominent outcome of this revolution is the advent of disruptive innovation, a phenomenon that has significantly impacted numerous facets of existence, including industry, economy, education, politics, and more. This disruption presents a challenge to established systems and compels institutions to undergo swift adaptation to maintain their relevance and effectiveness within a context characterized by automation, digitalization, and rapid technological progression (Erwin Akib, 2024).

In accordance with this global transition, the tourism sector is experiencing a significant metamorphosis fueled by the increasing integration of Artificial Intelligence (AI) throughout its ecosystem, which includes service automation, intelligent destination management, predictive analytics, and tailored customer interaction. This technological advancement has disrupted traditional employment frameworks, redefined essential professional competencies, and questioned conventional career trajectories (Ferràs et al., 2020; Ivanov & Webster, 2019). Amidst this dynamic environment, the concept of career sustainability, the ability to maintain meaningful, forward-looking, and adaptable career paths over time—has

emerged as a central concern in both educational and industrial contexts (Hirschi et al., 2021).

The integration of artificial intelligence within the tourism sector necessitates not only a high degree of technological proficiency but also emphasizes the importance of psychological and adaptive skills as pivotal components of employability (Håkansson Lindqvist et al., 2024). Consequently, in addition to providing students with specialized knowledge pertinent to the industry, educational programs in tourism and hospitality must also emphasize the development of psychological readiness, digital literacy, and resilience in career progression. In order to effectively navigate the intricacies and uncertainties introduced by digital transformation, it is imperative for students to cultivate the capacity for ongoing adaptation, learning, and flourishing, qualities encapsulated within the framework of career adaptability. Three constructs emerge as key predictors of career adaptability and sustainability in AI-enhanced environments: grit, resilience, and technological learning support (TLS).

- Grit, defined as perseverance and sustained interest in long-term goals, has been found to significantly influence adaptive career behaviors, particularly under conditions of uncertainty and transition (Duckworth et al., 2007; Li et al., 2022). This psychological attribute enables individuals to sustain effort and remain committed to their career goals even when facing prolonged challenges or ambiguous career pathways. In transitional work contexts, such as those shaped by rapid technological change, grit supports individuals in maintaining direction while adjusting strategies in response to evolving demands. The capacity to persist over time also helps individuals manage career-related stress and setbacks without losing long-term focus. Consequently, grit serves as an important internal resource that strengthens adaptive career responses and supports sustained career development across changing professional environments.

- Resilience, conceptualized as the capacity to rebound from adversity, enhances individuals' coping mechanisms and fosters adaptive functioning in digitally volatile tourism contexts (Ibrahim & Hussein, 2024). Resilient students are more likely to remain engaged and forward-looking, key attributes of sustainable career orientation. This capacity allows individuals to respond constructively to disruptions caused by technological change, organizational uncertainty, or shifting labor market expectations. By sustaining emotional stability and cognitive flexibility, resilience supports continuous

learning and proactive career adjustment in challenging environments. As a result, resilience functions as a foundational psychological resource that enables individuals to sustain motivation and adaptability throughout dynamic and technology-mediated career trajectories.

- Technological Learning Support (TLS) refers to students' perception of their educational environment as facilitating digital literacy and technological engagement (Sukhrobjonovna et al., 2024). TLS has been found to be positively associated with learning motivation, career self-efficacy, and perceived employability in technology-intensive sectors (Mingotto et al., 2021) (Rahma & Siregar, 2024).

Although the intersection of these variables has been examined in education and psychology, their integrated application in the AI-driven tourism domain, particularly in emerging economies remains limited. Within the Indonesian higher education context, where efforts are underway to incorporate digital and AI-related competencies into tourism curricula, the actual impact of these reforms on students' long-term career sustainability is not yet well understood (Sukma Yudistira, 2024). As students face a future marked by AI-induced shifts in labor demand, it becomes essential to understand how psychological readiness (grit and resilience) and environmental supports (TLS) interact through adaptability to shape sustainable career outcomes.

Therefore, this study aims to examine the mediating role of career adaptability in the relationship between grit, resilience, and technological learning support on students' career sustainability. Based on the proposed conceptual framework, the following hypotheses are formulated:

- H1: Grit has a positive and significant effect on Career Adaptability.
- H2: Resilience has a positive and significant effect on Career Adaptability.
- H3: Technological Learning Support (TLS) has a positive and significant effect on Career Adaptability.
- H4: Career Adaptability has a positive and significant effect on Career Sustainability.
- H5: Career Adaptability mediates the relationship between Grit and Career Sustainability.
- H6: Career Adaptability mediates the relationship between Resilience and Career Sustainability.
- H7: Career Adaptability mediates the relationship between Technological Learning Support (TLS) and Career Sustainability.

The study adopts a structured and transparent formulation of hypotheses to ensure analytical clarity and coherence with the proposed conceptual model, thereby facilitating systematic examination of both direct and mediated relationships among the key constructs.

METHODOLOGY

This study adopts a quantitative approach, utilizing numerical data to examine the relationships between variables and to test hypotheses through statistical analysis (Sekaran & Bougie, 2016). The research aims to explore how Grit, Resilience, and Technological Learning Support (TLS) influence Career Sustainability among tourism students, with Career Adaptability serving as a mediating variable.

The population in this study comprises seventh- and eighth-semester tourism students enrolled in several universities located in Java and Bali who are familiar with digital learning tools or curriculum content related to artificial intelligence and are willing to participate in a voluntary survey. These students are at a critical transition stage as they prepare to enter the tourism labor market, which is increasingly influenced by Artificial Intelligence (AI). Java and Bali were chosen due to their central roles in Indonesia's tourism education and industry ecosystems, providing a relevant and meaningful setting for examining career sustainability under AI-driven transformation.

The adequacy of the sample size was determined using several established approaches commonly applied in PLS-SEM studies. First, the minimum sample requirement was considered based on the general SEM rule of thumb, which recommends at least 10 respondents per indicator included in the model. To further ensure statistical robustness (Hair, Jr. et al., 2022), a G*Power analysis was conducted with parameters set at a statistical power of 0.95, an effect size of $f^2 = 0.15$ (medium), and a significance level of $\alpha = 0.05$. This analysis indicated a minimum required sample size of approximately 119 respondents (Neuha et al., 2023). In addition, the inverse square root method proposed by Kock and Hadaya (2018) was applied as a complementary assessment, confirming that a sample size exceeding 150 is sufficient to detect medium effect sizes with high statistical power in PLS-SEM. Based on these combined considerations, a total of 167 valid responses were collected and deemed adequate to support reliable estimation of the proposed research model.

The research instrument used is a structured questionnaire designed to capture data on all variables: Grit, Resilience, Technological Learning Support, Career Adaptability, and

Career Sustainability. A six-point Likert scale was employed, ranging from 1 (strongly disagree) to 6 (strongly agree), to measure participants' perceptions, attitudes, and self-assessments regarding the constructs under investigation (Chang, 1994).

Primary data were collected through field surveys using online questionnaires administered by Google Forms, which were distributed to tourism students across participating universities. This approach facilitated efficient data collection while ensuring accessibility for respondents. Secondary data were obtained from previous empirical studies, academic journals, and relevant scholarly literature to support the development of the theoretical framework and research hypotheses. The integration of primary and secondary data strengthens the study by grounding the empirical analysis within established academic knowledge.

For data analysis, the study utilized Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4.0. The analysis was conducted in two stages: the first stage assessed the measurement model, evaluating the validity and reliability of the constructs; the second stage tested the structural model to analyze the hypothesized relationships among variables. This dual-stage approach ensures both the quality of the measurement instruments and the robustness of the theoretical model (Hair et al., 2019).

Descriptive statistics were also employed to provide an overview of respondent characteristics, while inferential analysis was used to test the significance of each path in the proposed model. Validity and reliability tests, including composite reliability and Average Variance Extracted (AVE), were conducted to ensure that all constructs meet the necessary thresholds for inclusion in the final analysis.

Hypothesis Development

Career sustainability refers to one's ability to maintain employability and meaningful career progression over time, especially in the face of technological, economic, and social changes (Fryczyńska, 2020; McMahon & Abkhezr, 2025). In AI-driven tourism, sustainability demands adaptability, lifelong learning, and psychological readiness to face evolving job roles and competencies (Sigala, 2021). Unlike traditional job stability, it emphasizes continuous personal development in response to shifting labor market demands. The integration of AI—through predictive analytics, automation, and personalized services—has redefined required skills in tourism (Chiu et al., 2022), making students' long-term employability reliant not only

Technological Learning Support (TLS) and Career Sustainability

Technological Learning Support (TLS) is articulated as the perception that an individual's learning environment furnishes adequate tools, resources, and encouragement to cultivate digital and AI-related competencies. In the domain of tourism education, this encompasses access to digital simulations, AI-integrated platforms, and instructional materials pertinent to emerging technologies (Bulchand-Gidumal, 2022). TLS correlates with the construct of Learning Climate and has been associated with enhanced digital readiness, engagement, and confidence among students. When students perceive robust technological support, they are significantly more likely to feel equipped to navigate career trajectories in technology-oriented sectors, such as AI-enhanced tourism (Liu, 2023). H3: Technological Learning Support has a positive and significant effect on Career Sustainability among tourism students.

Grit and Career Adaptability

Grit, as articulated by Duckworth et al. (2007), encompasses persistent perseverance and profound passion directed towards long-term aspirations, and is regarded as a vital adaptive resource within the Career Construction Model of Adaptation (Savickas, 2013). As a dispositional attribute, grit catalyzes and fortifies the evolution of career adaptability—a fundamental psychosocial competency that consists of concern, control, curiosity, and confidence—thereby equipping individuals to adeptly navigate career transitions and uncertainties. Empirical research (Lestari et al., 2022; Li et al., 2021; Simşir & Koç, 2024) substantiates that individuals characterized by grit consistently exhibit elevated levels of career adaptability, thus facilitating proactive career planning, emotional regulation, and autonomous learning. This direct correlation is particularly crucial in the realm of AI-driven tourism, wherein adaptability delineates the potential for sustained and forward-looking career advancement. H4: Grit has a positive and significant effect on Career Adaptability.

Resilience and Career Adaptability

Resilience refers to the psychological capacity to recover from stress, uncertainty, or adversity. It is closely linked to emotional regulation, self-efficacy, and cognitive flexibility. In the hospitality and tourism sectors, resilience has been found to enhance career adaptability by enabling individuals to face dynamic changes and work-related

on technical knowledge but also on personal capacities such as grit, resilience, and technological learning readiness (Oliveras-Villanueva et al., 2020).

Grit and Career Sustainability

Grit, defined as sustained passion and perseverance for long-term goals (Duckworth et al., 2007), is linked to persistence in academic and career pursuits. In the context of career sustainability, grit supports individuals in staying committed to their goals amid industry shifts driven by AI and digital change. Research shows that gritty individuals tend to engage in proactive career behaviors, experience higher job satisfaction, and adapt better in dynamic job markets (Robertson-Kraft & Duckworth, 2014). However, its role in technology-driven tourism education remains underexplored.

H1: Grit exerts a positive and significant influence on Career Sustainability among tourism students.

Resilience and Career Sustainability

Resilience represents the psychological capacity to adapt, endure, and recover from stressors and adversity, which plays a crucial role in sustaining long-term career trajectories. Within higher education contexts, particularly during demanding phases such as thesis completion, resilience enables students to manage academic pressure, maintain motivation, and regulate emotional responses. Empirical evidence shows that lower levels of resilience are often associated with academic procrastination and disengagement, whereas resilient students demonstrate persistence, emotional stability, and effective coping strategies that support sustained academic progress (Siti Fatimah Awalyah Rijal et al., 2024). In addition, Ross et al. (2023) highlight that resilience contributes to students' ability to remain engaged and forward-oriented when balancing academic responsibilities with industry exposure, which is essential for maintaining continuity in career preparation. Similarly, Zen et al. (2024) emphasize that resilience strengthens individuals' capacity to navigate transitional challenges, reducing the risk of delayed graduation and career disruption. Taken together, these findings suggest that resilience functions as a key psychological resource that supports career sustainability by enabling tourism students to remain adaptive, engaged, and future-oriented throughout periods of academic and professional transition.

H2: Resilience has a positive and significant effect on Career Sustainability among tourism students

crises with psychological strength. Studies indicate that Psychological Capital, including resilience, optimism, and hope, significantly contributes to higher levels of career adaptability, which in turn promotes job and life satisfaction. Individuals with high resilience are more likely to exhibit confident and proactive behaviors, enabling them to navigate career transitions effectively and build sustainable career trajectories (Safavi & Bouzari, 2019).

(H5): Resilience shows a positive and significant effect on career adaptability.

Technological Learning Support (TLS) and Career Adaptability

Technological Learning Support (TLS) refers to the availability of institutional and pedagogical support aimed at improving technological competence, especially in AI-related domains. AI-enabled adaptive learning environments significantly strengthen sustainable competencies among tourism and hospitality students (Neophytou et al., 2025). In the digital tourism domain, continuous upskilling and technological training have been shown to increase individuals' confidence and curiosity, key dimensions of career adaptability (UNESCO, 2024). By facilitating technological fluency and continuous learning, TLS enhances individuals' perceived control over their career development in an AI-driven environment.

H6: TLS has a positive and significant effect on career adaptability.

Career Adaptability and Career Sustainability

Career sustainability reflects the ability to maintain a viable, meaningful, and evolving career over time. Career adaptability plays a vital role in this process, particularly in environments characterized by volatility and digital transformation. Makwa & Maryadi, (2025) found that career adaptability significantly influences career sustainability by enabling individuals to respond to labor market changes with proactive strategies. In tourism, adaptability has been linked to greater satisfaction, lower burnout, and increased innovation key indicators of sustainable careers. Individuals who actively manage and adapt to career challenges are more likely to build lasting and resilient careers, particularly in AI-driven sectors.

(H7): Career adaptability has positive and significant on career sustainability.

Career Adaptability as a Mediating Variable

Career Adaptability represents a psychosocial construct that encapsulates an individual's preparedness and resources for addressing present and forthcoming tasks, transitions, and adversities within their professional roles. It encompasses four dimensions: concern (anticipating future needs), control (assuming accountability), curiosity (investigating alternatives), and confidence (having faith in one's capabilities). Career Adaptability holds particular significance in domains marked by swift transformations. In the context of AI-driven tourism, students exhibiting career adaptability are positioned to react proactively to technological advancements, acquire new skills as necessary, and sustain a coherent trajectory amidst ambiguous career pathways. Empirical investigations have substantiated that adaptability functions as a mechanism that connects individual psychological resources and external learning supports to career outcomes. Consequently, it is posited that Career Adaptability will mediate the relationship among Grit, Resilience, TLS, and Career Sustainability.

H8: Career Adaptability mediates the relationship between Grit and Career Sustainability.

H9: Career Adaptability mediates the relationship between Resilience and Career Sustainability.

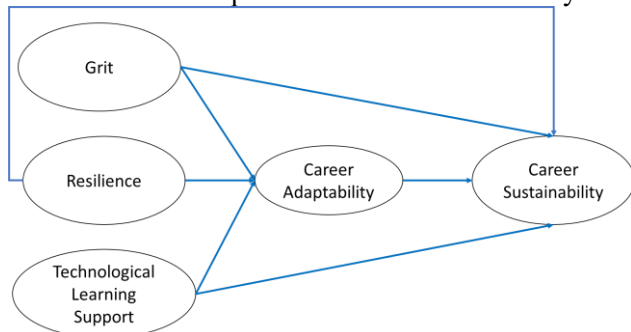
H10: Career Adaptability mediates the relationship between Technological Learning Support and Career Sustainability.

Theoretical Framework

This investigation synthesizes the Career Construction Theory with the Psychological Capital Theory and components of Technology-Enhanced Learning Theory. These theoretical frameworks propose that Individuals possess the capacity to construct their own career trajectories by utilizing personal strengths (e.g., grit and resilience), Educational contexts furnish structural support (TLS) that influences learners' career efficacy and adaptability. Career Adaptability serves as a pivotal psychological resource that facilitates sustainable careers within volatile, technology-driven sectors (Zhao et al., 2022); (Silva et al., 2022).

Conceptual Model

Below is the conceptual framework of this study:



RESULT AND DISCUSSION

The final dataset comprised 167 valid responses from final-year tourism students across various Indonesian higher education institutions. This group was selected for their imminent entry into the tourism workforce, particularly amid increasing AI integration in the industry. The sample was predominantly female (63.5%, $n = 106$), with males representing 36.5% ($n = 61$), reflecting typical gender patterns in tourism education. Most respondents (80.2%, $n = 134$) had studied digital technologies, and 92.2% ($n = 154$) reported at least some exposure to AI-related topics, indicating a high level of technological engagement and relevance for analyzing career sustainability in AI-driven tourism.

Evaluation of Measurement Model (Outer Model)

The outer model was assessed to ensure construct validity and reliability of all latent variables. All items showed outer loadings above 0.70, except two items from the Career Adaptability scale which were below 0.65 and thus removed. After adjustment, all retained items met the recommended threshold (Hair et al., 2021).

Internal Consistency Reliability

Table 1 Measurement Model Reliability and Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE
Grit	0.84	0.88	0.59
Resilience	0.81	0.87	0.61
Technological Learning Support (TLS)	0.86	0.89	0.62
Career Adaptability	0.89	0.91	0.64
Career	0.87	0.90	0.60

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE
Sustainability			

All constructs demonstrated strong internal consistency ($CR > 0.70$) and satisfactory convergent validity ($AVE > 0.50$).

Discriminant Validity

Both the Fornell-Larcker Criterion and the HTMT ratio confirmed discriminant validity. The AVE values were greater than inter-construct correlations, and all HTMT values were below the conservative threshold of 0.85.

Path Coefficients and Hypothesis Testing Direct Effect

Table 2 Direct Effect

Hypotesis	β	T Stat	P Values	Result
H1 Grit $\rightarrow$ Career Sustainability	0.152	2.04	0.042	Supported
H2 Resilience $\rightarrow$ Career Sustainability	0.198	2.71	0.007	Supported
H3 TLS $\rightarrow$ Career Sustainability	0.236	3.29	0.001	Supported
H4 Grit $\rightarrow$ Career Adaptability	0.210	2.58	0.020	Supported
H5 Resilience $\rightarrow$ Career Adaptability	0.289	3.83	0.000	Supported
H6 TLS $\rightarrow$ Career Adaptability	0.331	4.28	0.000	Supported
H7 Career Adaptability $\rightarrow$ Career Sustainability	0.419	5.87	0.000	Supported

Statistical significance was assessed at $\alpha = 0.05$, with t-values exceeding the critical threshold indicating significant effects. The analysis of direct effects indicates that Grit has a positive and statistically significant influence on Career Sustainability ($\beta = 0.152$, $t = 2.04$, $p = 0.042$), followed by Resilience ($\beta = 0.198$, $t = 2.71$, $p = 0.007$), while Technological Learning Support

demonstrates the strongest direct effect ($\beta = 0.236$, $t = 3.29$, $p = 0.001$). The results further show that these three antecedent variables significantly predict Career Adaptability, with positive effects observed for Grit ($\beta = 0.210$, $t = 2.58$, $p = 0.020$), Resilience ($\beta = 0.289$, $t = 3.83$, $p < 0.001$), and Technological Learning Support ($\beta = 0.331$, $t = 4.28$, $p < 0.001$). In addition, Career Adaptability exerts a strong and statistically significant effect on Career Sustainability ($\beta = 0.419$, $t = 5.87$, $p < 0.001$). Collectively, these findings indicate that individual psychological resources and technological learning support contribute to career sustainability both directly and indirectly through Career Adaptability.

Table 3 Indirect Effects of Career Adaptability

Hypothesis	β	T	P	Result
Stat Values				
H8 Grit→Career Adaptability→ Career Sustainability	0.088	2.39	0.017	Supported
H9 Resilience →Career Adaptability→ Career Sustainability	0.121	3.02	0.003	Supported
H10 TLS → Career Adaptability →Career Sustainability	0.139	3.60	0.001	Supported

All proposed hypotheses received empirical support, demonstrating that each predictor exerts a significant influence on Career Sustainability both directly and indirectly through the mediating variable of Career Adaptability.

The indirect effect analysis, conducted using a bootstrapping procedure within the PLS-SEM framework, shows that Career Adaptability plays a partial mediating role in the relationships between Grit, Resilience, Technological Learning Support (TLS), and Career Sustainability. This conclusion is drawn from the presence of statistically significant indirect effects alongside significant direct effects linking the three antecedent variables to Career Sustainability. These findings indicate that, while Grit, Resilience, and TLS exert direct influences on career sustainability, their contributions are further strengthened through Career Adaptability. In this sense, Career Adaptability functions not simply as an outcome

variable, but as an adaptive mechanism that enables individuals to translate personal strengths and supportive learning environments into sustainable career trajectories within an AI-driven tourism context (Venugopal, 2022).

Additional Findings and Interpretation

The strongest direct predictor of Career Sustainability is Career Adaptability $\beta = 0.419$ (H7), followed by TLS $\beta = 0.236$ (H3). This finding suggests that while Grit and Resilience are important personal traits, the ability to adapt one's career strategy in a changing technological context is more critical.

The significant path from TLS to Career Adaptability $\beta = 0.331$ (H6) indicates that digital and AI-related learning support structures such as virtual simulations, industry-based AI modules, and smart classroom environments play a pivotal role in helping students build career adaptability. This aligns with the growing discourse that education systems must evolve to support career transitions in technologically volatile sectors.

Furthermore, the findings imply that students who are persistent (Grit), emotionally adaptable (Resilience), and well-supported in digital learning environments are better positioned to maintain sustainable careers in the dynamic tourism industry influenced by AI. These students are more likely to continuously upskill, embrace innovation, and remain engaged in their profession over the long term.

Summary of Key Findings

All three predictor variables :

- 1) Grit, Resilience, and Technological Learning Support positively influence Career Sustainability, both directly and through Career Adaptability
- 2) Career Adaptability is a significant mediating mechanism, suggesting that institutions should not only develop student traits but also foster career specific flexibility and planning.
- 3) The role of technological learning support is increasingly essential in tourism education, especially as AI transforms the skill demands in the sector.

Discussion and Implications

The findings suggest that career sustainability among tourism students emerges from a dynamic interaction between individual psychological resources and institutional learning support within an AI-driven environment. The positive roles of grit and resilience indicate that sustained effort, perseverance, and the

capacity to recover from challenges enable students to navigate ongoing career uncertainty shaped by rapid technological change. At the same time, the strong contribution of technological learning support highlights the importance of structured learning environments that facilitate continuous skill development aligned with evolving industry demands. Central to these relationships is career adaptability, which operates as an adaptive mechanism through which personal strengths and external support are actively translated into sustainable career pathways. In this sense, career sustainability is shaped less by isolated traits or technological exposure and more by individuals' ability to reinterpret, adjust, and align their competencies with changing career opportunities in AI-enhanced tourism contexts.

Building on this interpretation, the findings underscore the importance of fostering both psychological resilience and supportive institutional environments to prepare tourism graduates for long-term career sustainability. Educational institutions are encouraged to move beyond a narrow focus on technological competence by also cultivating internal resources such as persistence, adaptability, and reflective career planning. The results further suggest that a resilient mindset or access to technological learning support alone does not automatically lead to sustainable career outcomes. Rather, career adaptability serves as the critical channel that integrates these internal and external resources into meaningful and enduring professional trajectories. Within the context of tourism education in Indonesia, these insights contribute to ongoing discussions on how higher education institutions can respond strategically to technological disruption, automation, and shifting skill requirements in an increasingly AI-driven tourism industry.

Grit, defined as the perseverance and passion for long-term goals (Duckworth et al., 2007), was shown to significantly predict both Career Adaptability and Career Sustainability. This supports prior research which found that students with higher levels of grit tend to be more resilient in managing setbacks and more consistent in pursuing career goals despite uncertainty (Li et al., 2021).

In the context of tourism which is volatile and seasonal by nature grit is particularly valuable. As AI changes job roles, students who are gritty will likely persevere through transitional phases such as reskilling or adapting to technology-mediated service environments. The positive association between grit and career adaptability also aligns with (Aljofan et al., 2024) career construction theory, which posits that adaptive readiness is fueled by

psychological resources such as persistence. Thus, gritty individuals are not only focused on the end goal but are also more likely to engage in proactive behaviors, like learning about AI or developing soft skills, which ultimately support sustainable careers.

Resilience, the ability to bounce back from stress or adversity, is another key personal trait identified in this study as significantly predicting both career adaptability and sustainability. This supports prior studies in hospitality education, which found resilience to be crucial in maintaining career intentions amid uncertainty or hardship (Zen et al., 2024). In the AI context, resilience becomes critical. Many tourism roles, especially operational or front-line ones, are susceptible to automation or radical transformation. This creates anxiety among students and graduates. A resilient individual will not only manage such emotional stress but will actively seek ways to reframe challenges as learning opportunities. This study thus contributes by validating the role of resilience as both a psychological buffer and a motivational amplifier in sustaining career goals in high-change environments (Üngüren & Kaçmaz, 2022).

TLS emerged as a strong predictor of both career adaptability and sustainability, underscoring the vital role of educational institutions in equipping students with meaningful technological exposure. TLS includes not only the availability of digital tools (e.g., LMS platforms, AI labs, industry simulations) but also instructional quality, feedback mechanisms, and AI-integrated curricula. These findings support studies (Hui et al., 2021), which highlight that digital learning environments enhance students' engagement, adaptability, and confidence in using emerging technologies. In tourism, this is especially relevant as operations move toward automation, predictive analytics, and intelligent customer service.

Students experience a learning environment where digital tools are normalized and pedagogically embedded, their sense of career self-efficacy and adaptability increases. This prepares them not just to enter the tourism industry, but to shape its evolution (Kumi et al., 2024).

The central role of Career Adaptability as a mediator reinforces its function as a psychological mechanism through which students convert internal traits and external support into career sustainability. emphasize career adaptability as a multidimensional construct, concern, control, curiosity, and confidence that enables future-oriented career planning and navigation (Makwa & Maryadi, 2025).

Our findings suggest that even when students have grit or

resilience, without the adaptive mindset and behaviors needed to explore options, manage transitions, and seek information, career sustainability is unlikely to emerge. This emphasizes the need for curriculum designers to integrate career adaptability skills training—such as scenario planning, AI fluency, and digital project simulations—into tourism programs (Rudolph & Zacher, 2023).

The rapid integration of artificial intelligence into the tourism industry has fundamentally reshaped the landscape of career demands faced by new graduates. Technologies such as AI-powered booking systems, service chatbots, emotion recognition in hospitality settings, and smart tourism ecosystems increasingly redefine how work is organized and how skills are valued within the sector (Misra, 2023). As a result, tourism graduates are required to navigate not only technological complexity but also heightened uncertainty in career trajectories.

The findings of this study indirectly suggest that preparing students for AI-driven tourism extends beyond the development of technical competencies alone. While Technological Learning Support (TLS) plays a significant role in shaping career outcomes, the results indicate that technological training becomes meaningful only when students are able to perceive, engage with, and adapt to AI-related changes in constructive ways. This interpretation aligns with prior research emphasizing that successful adaptation to AI-driven work environments involves a combination of mindset, perception, and the integration of durable skills alongside technical expertise. In this context, adaptability is shaped not merely by the acquisition of digital skills, but also by a broader understanding of the societal and ethical implications of AI, the cultivation of a growth-oriented mindset, and the strengthening of critical thinking and adaptive capacities (Grubaugh & Levitt, 2023).

Taken together, the study highlights that career sustainability in tourism increasingly depends on an integrated set of personal and contextual resources that extend beyond traditional domain knowledge. These resources include persistence reflected in grit, emotional flexibility reflected in resilience, meaningful exposure to and engagement with technology through TLS, and strategic career agency enabled by career adaptability. Such an integrated capacity becomes particularly important in navigating the complex and dynamic conditions of the tourism industry, especially in the aftermath of systemic disruptions such as the COVID-19 pandemic (Preko & Anyigba, 2024).

Within this framework, the prominence of Technological Learning Support emerges as a key and actionable finding. The results underscore the central role of educational institutions in shaping career sustainability by designing structured, technology-oriented learning environments that support continuous skill development and adaptive learning. Viewed through the lens of career adaptability, TLS functions not merely as a contextual resource, but as a strategic lever through which institutions can actively foster students' capacity to translate technological exposure into long-term career viability. By integrating technological learning support with curricula that encourage adaptive thinking, reflective career planning, and ethical awareness, tourism education can move beyond reactive skill training toward a more sustainable and future-oriented model of graduate employability.

The findings of this study offer several practical implications for tourism higher education institutions seeking to prepare students for sustainable careers in an AI-driven industry. First, there is a clear need for curriculum redesign that incorporates AI awareness modules, adaptive career development workshops, and real-time simulations of smart tourism scenarios to foster adaptability and future-readiness among students. Second, the integration of digital pedagogy must go beyond the provision of infrastructure; educators should embed practical AI use cases—such as facial recognition in airports or robotic concierge services—into case studies, problem-based learning, and collaborative projects, thereby contextualizing technological change within the tourism domain.

Third, institutions must adopt a holistic approach to student support, with psychological services and career counseling centers offering resilience training and grit-based coaching to help students develop the personal resources needed to thrive in dynamic career environments. Finally, building strong partnerships with industry, particularly with AI-focused tourism enterprises such as travel tech startups and hotel chains integrating intelligent systems, will enable students to access internships, mentorship opportunities, and first-hand insights into digital transformation thus bridging the gap between academic preparation and real-world professional demands.

This study offers a theoretical contribution by integrating psychological traits (grit, resilience), institutional factors (Technological Learning Support), and cognitive career resources (career adaptability) into a unified model of career sustainability within the context of AI-driven tourism. Unlike prior studies that focus narrowly on short-

term employability, this research shifts the lens toward long-term sustainability, particularly after students enter the workforce. Moreover, it introduces Technological Learning Support (TLS) as a structured, pedagogically grounded construct that goes beyond digital access to encompass learning design and adaptive engagement. The model recognizes career sustainability not as a fixed state but as a developmental trajectory shaped by individual dispositions and technology-oriented learning environments. By applying this model in the context of an emerging economy, the study also adds a culturally relevant dimension to the literature on future-ready career development.

From a policy perspective, the study calls for a paradigm shift in tourism education—from short-term job placement to long-term career sustainability. Institutions should embed AI awareness, ethical literacy, and adaptability training into the core curriculum. Policymakers should also revise graduate performance metrics to include indicators of digital resilience and adaptive capacity. Building industry-academic partnerships, especially with AI-integrated tourism companies, will also be essential in aligning graduate profiles with evolving industry demands. This research provides significant contributions to the understanding of career sustainability within the context of AI-driven tourism; nevertheless, several limitations warrant attention. The cross-sectional approach constrains the ability to infer causation, underscoring the necessity for longitudinal investigations to assess how traits such as grit, resilience, and adaptability develop over time. The participant sample, which is confined to final-year tourism students in Indonesia, may lack generalizability to early-career professionals or different cultural environments. Subsequent research should encompass cross-national analyses to investigate how varying educational and labor frameworks impact responses to the integration of AI technologies. Moreover, the dependence on self-reported measures may introduce potential biases; therefore, the incorporation of multi-source evaluations could enhance the robustness of the findings. Future inquiries might also integrate supplementary constructs such as digital self-efficacy and AI mindset to enrich the comprehension of sustainable career practices. Lastly, an exploration of AI exposure as a moderating variable could elucidate how engagement with technology shapes the relationship between psychological characteristics and career sustainability, thereby providing a more nuanced model of career progression in rapidly evolving digital landscapes. The tourism sector is rapidly evolving with AI integration,

demanding a shift from work readiness to long-term career sustainability. This study identifies Grit, Resilience, and Technological Learning Support (TLS) as key predictors, with Career Adaptability mediating their impact on career sustainability among Indonesian tourism students. Grit and TLS showed the strongest effects, emphasizing the role of both motivation and institutional support. The study advances theory by linking psychological capital with AI-driven career outcomes and urges the adoption of adaptive, tech-integrated education. Despite limitations in scope and method, the findings underscore the need to prepare students for sustainable, future-ready careers.

Beyond the empirical results, this study encourages a more reflective way of understanding career development in tourism at a time when technological change is becoming increasingly pervasive. Career sustainability, as suggested by the findings, is better understood as an ongoing and adaptive process rather than a static outcome achieved upon graduation. In AI-driven tourism environments, careers are continuously shaped through the interplay between personal dispositions, learning opportunities, and shifting technological demands. Viewing career development through this lens invites future research to move beyond cross-sectional snapshots and to pay closer attention to how careers are gradually constructed, adjusted, and sustained across different stages of professional life.

At a broader level, the study also speaks to the evolving responsibility of tourism education in preparing graduates for uncertain and technology-mediated futures. While technical competence remains essential, the findings highlight the importance of maintaining a human-centered orientation in educational design—one that nurtures adaptability, resilience, and reflective career agency alongside technological skills. By situating career sustainability within the context of AI-driven tourism, this research offers a starting point for deeper conversations on how educational institutions, industry stakeholders, and policymakers can collaboratively support the development of careers that remain meaningful, adaptive, and sustainable amid ongoing technological transformation.

CONCLUSION

In response to the ongoing digital transformation in the tourism industry, this study presents a comprehensive model linking psychological capital, institutional support, and career adaptability to career sustainability. The findings emphasize that grit, resilience, and Technological

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Learning Support significantly influence sustainable career outcomes, both directly and indirectly via adaptability. This suggests that tourism education must evolve from traditional employability models toward integrative frameworks that prioritize long-term resilience and adaptability in the face of AI disruption. Future research should further examine this model across different cultural and institutional contexts and consider longitudinal designs to track career development over time.

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DECLARATIONS

Conflict of Interest, We declare no conflict of interest, financial or otherwise.

ETHICAL APPROVAL

The corresponding author, on behalf of all authors, affirms that the study complies with ethical standards. No human subjects or animals were involved in the research, and all procedures were conducted according to applicable ethical guidelines and regulations.

INFORMED CONSENT

On behalf of all authors, the corresponding author confirms that all informants have given their informed consent and agreed to the inclusion of their information in the study.

DATA AVAILABILITY

The data supporting the findings of this study can be obtained from the corresponding author upon request.

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