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Tourism Entrepreneurial Agility among Women Entrepreneurs: Linking Digital Entrepreneurial Orientation to Business Sustainability

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ABSTRACT

Women-owned tourism enterprises contribute substantially to destination competitiveness and inclusive economic development in regions that rely on tourism; however, their long-term survival remains a pressing concern. Little is known about the adaptive, tourism-specific mechanisms through which digital entrepreneurial capabilities relate to business sustainability. Grounded in Dynamic Capability Theory, this study introduces Tourism Entrepreneurial Agility (TEA), a tourism-contextualized form of entrepreneurial agility that captures how entrepreneurs detect shifts in the tourism market, modify their products and services, rearrange business resources, and implement innovative responses. This study investigates how Digital Entrepreneurial Orientation (DEO), AI Capability (AIC), Opportunity Alertness (OA), TEA, and Business Sustainability (BS) are related among women who run tourism-related businesses in the Borobudur Priority Tourism Area, Indonesia. Survey responses from 272 women entrepreneurs were examined using partial least squares structural equation modelling (PLS-SEM) in SmartPLS 4. TEA is positively linked to DEO (β = 0.389), AIC (β = 0.334), and OA (β = 0.237), and BS is in turn positively linked to TEA (β = 0.520). OA is also directly and positively related to BS (β = 0.629), while the direct DEO–BS path is negative but not statistically significant (β = -0.220). DEO, AIC, and OA each display significant indirect links with BS via TEA; since the model contains no direct AIC–BS path, the AIC finding is treated as a specific indirect association instead of conventional mediation. These results empirically support viewing TEA as a tourism-contextualized adaptive capability that connects entrepreneurial and technological capabilities with sustainable business outcomes. This study extends tourism entrepreneurship scholarship by situating entrepreneurial agility in women-owned tourism firms and suggests practical ways to build adaptive capabilities in emerging destinations.

Keywords: AI Capability; Business Sustainability; Digital Entrepreneurial Orientation; Opportunity Alertness; Tourism Entrepreneurial Agility

1. INTRODUCTION

Women-owned tourism businesses matter for more than their owners: their continuity supports destination competitiveness, inclusive growth, and community resilience in areas whose economies depend on visitors. Through tourism-based ventures, women create jobs, safeguard local cultural heritage, broaden the range of tourism products, and drive regional economic activity (Kimbu et al., 2024; Kutlu and Ngoasong, 2024). The accelerating digitalisation of tourism now obliges these entrepreneurs to combine digital tools with new business practices if they wish to stay competitive and secure their firms' future (Kaihatu *et al.*, 2024). Artificial intelligence (AI) has added another layer of change, giving entrepreneurs new means to engage customers, tailor services, refine marketing, and make better-informed decisions (Roy, 2025). However, numerous women-owned tourism businesses still struggle to keep pace with shifting tourist tastes, technological disruption,

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and growing competition (Gomes et.al, 2024). Such difficulties imply that sustainability rests not only on adopting technology but also on the entrepreneur's ongoing ability to adjust to environmental change through dynamic entrepreneurial capabilities (Agrawal *et al.*, 2025).

Tourism is one of the sectors Indonesia relies on to pursue sustainable economic development, and the Borobudur Priority Tourism Area has been designated as a flagship site for tourism-driven regional transformation (Kausar et.al, 2024). In addition to its status as a UNESCO World Heritage Site, Borobudur has benefited from substantial public investment in infrastructure, digital promotion of the destination, and community-based empowerment programs intended to reinforce the resilience of the local economy (Munim and Amelia, 2026). Women play a central role in this ecosystem as operators of homestays, culinary and handicraft businesses, souvenir workshops, tour services, and various other creative tourism ventures (Rahmad and Hastriana, 2026). However, keeping these enterprises viable has become more challenging as competition intensifies, technology evolves quickly, tourist expectations change, and the pressure to innovate in services rises. Although earlier work has shown that digital transformation and innovation improve tourism performance and sustainability, many local operators still find it difficult to convert digital resources into lasting competitive advantage (León-Gómez *et al.*, 2025). Identifying the capabilities that allow women entrepreneurs to make productive use of digital orientation, AI capability, and opportunity recognition is therefore a timely research priority for fostering sustainable tourism entrepreneurship in emerging destinations like Borobudur (Kapota et.al, 2023; Parihar *et al.*, 2025).

The literature characterizes digital entrepreneurial orientation as a strategic posture that leads entrepreneurs to adopt digital technologies, innovate, and act ahead of environmental change, which in turn enhances competitiveness and performance over time (Nambisan, 2017; Covin and Wales, 2019). AI capability has likewise come to be regarded as a key resource, allowing entrepreneurs to interpret market data, automate processes, customise customer experiences, and inform strategic choices as businesses become more digital (Dwivedi *et al.*, 2021; Mikalef and Gupta, 2021). Opportunity alertness, for its part, is understood as a cognitive capability through which entrepreneurs spot new market openings, foresee what customers will need, and act on uncertainty earlier than rivals (Casanova et al., 2023). Taken together, these capabilities have been linked to innovation, competitive advantage, and sustained performance in a range of organizational settings (Vu, 2020). However, evidence remains mixed on whether they lead directly to business sustainability, especially for women entrepreneurs in tourism destinations where conditions shift rapidly and demand is volatile. Some work even indicates that entrepreneurial orientation may affect sustainability mainly by way of organizational agility rather than directly, underscoring the need to uncover the mechanisms that convert entrepreneurial capabilities into sustainable outcomes (Kraus *et al.*, 2018).

Research on entrepreneurial agility has expanded; however, most studies treat agility as a generic capacity to cope with changing business conditions and pay little attention to how it appears in tourism entrepreneurship (Karimi and Walter, 2021). In tourism, entrepreneurs must track visitor preferences, modify services, rearrange resources, and react to shifting destination conditions on an ongoing basis (Zeng *et al.*, 2024). This setting gives entrepreneurial agility particular relevance, yet few studies have explored how it functions in tourism ventures, and even fewer have focused on women entrepreneurs in emerging destinations. Building on dynamic capability theory (Teece et al., 1997), the present study conceptualises tourism entrepreneurial agility (TEA) as an operationalisation of entrepreneurial agility tailored to the tourism context. TEA denotes the entrepreneur's capacity to notice changes in the tourism market, modify tourism products and services, rearrange available resources, and carry out suitable responses as conditions evolve. TEA is positioned here as the intervening mechanism that connects digital entrepreneurial orientation, AI capability, and opportunity alertness to business sustainability.

Because several neighbouring concepts exist, it is useful to set TEA apart from them. Entrepreneurial agility usually describes how quickly an entrepreneur perceives and reacts to changes and opportunities. Strategic agility concerns an organisation 's capacity to revise its strategic direction and priorities when the environment shifts, and organizational agility refers more widely to an organisation 's ability to detect change and swiftly reorganise its processes, structures, and

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resources. Dynamic capabilities form the overarching theoretical lens, describing how firms sense opportunities and threats, seize opportunities, and transform or reconfigure their resources. TEA, by comparison, centres on the individual entrepreneur running a tourism-related business and frames entrepreneurial agility around changes peculiar to tourism, such as shifting tourist demand and preferences, developments in tourism technology, competition between destinations, and the need to revise tourism offerings. TEA is thus best regarded as a tourism-contextualized operationalisation of entrepreneurial agility, not as an entirely new agility paradigm.

From a dynamic capability theory standpoint, this study argues that the sustainability of women-owned businesses depends on both the digital entrepreneurial resources they hold and their ability to turn those resources into adaptive entrepreneurial action (Teece et al., 1997). Women entrepreneurs with a stronger digital entrepreneurial orientation are likely to be more forward-looking in adopting digital innovations and capitalising on new technological possibilities (Anzak et al., 2023). Similarly, higher AI capability can aid decision-making, customer engagement, and efficiency, and keener opportunity alertness can help entrepreneurs notice and act on tourism opportunities ahead of competitors (Casanova et al., 2023). When tourism conditions change quickly, these capabilities may pay off more when entrepreneurs can modify offerings, reorganise resources, and react to market shifts (Rahman *et al.*, 2026). Accordingly, tourism entrepreneurial agility is examined here as the central mechanism connecting digital entrepreneurial orientation, AI capability, and opportunity alertness with the sustainability of women-owned tourism businesses.

The study offers three contributions to entrepreneurship and tourism scholarship. The first concerns the conceptualisation of entrepreneurial agility, which is operationalised in this study in the tourism setting. TEA is framed as a tourism-contextualized variant of entrepreneurial agility that highlights the entrepreneur's capacity to detect tourism market changes, modify tourism offerings, reorganise resources, and react to evolving destination conditions. Instead of presenting TEA as a wholly new, stand-alone capability, the study shows how the wider notion of entrepreneurial agility can be put into operation in tourism entrepreneurship (Warner and Wäger, 2019). The second contribution relates to Dynamic Capability Theory: the study tests TEA as an intervening capability that connects digital entrepreneurial orientation, AI capability, and opportunity alertness with business sustainability (Teece et al., 1997). The third contribution is empirical, drawing on PLS-SEM analysis in SmartPLS 4 of data from 272 women who run tourism-related businesses in the Borobudur Priority Tourism Area, Indonesia. The results add to work on women's entrepreneurship, digital entrepreneurship, and sustainable tourism, and they carry practical lessons for building adaptive capabilities in small tourism businesses.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Dynamic Capability Theory

The theoretical foundation of this study is *dynamic capability theory*, according to which lasting competitive advantage stems less from owning valuable resources than from a firm's ability to detect environmental change, capture new opportunities, and repeatedly reorganise its resources as markets evolve (Teece et al., 1997). As tourism becomes more digital and competitive, entrepreneurs must keep revising their business models, embedding digital tools, and creating new tourism offerings to stay competitive and remain viable over the long term (Warner and Wäger, 2019; Santarsiero *et al.*, 2024). Therefore, the theory offers a suitable lens for explaining how women entrepreneurs' digital entrepreneurial orientation, AI capability, and opportunity alertness may relate to sustainable business outcomes through tourism entrepreneurial agility (Teece et al., 1997; Santarsiero *et al.*, 2024). Through this lens, TEA is a tourism-contextualized expression of entrepreneurial agility that allows entrepreneurs to quickly identify market shifts, modify their offerings, reorganise resources, and introduce innovative responses to generate customer value and sustain performance.

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2.2 Digital Entrepreneurial Orientation and Tourism Entrepreneurial Agility

Digital entrepreneurial orientation captures an entrepreneur's strategic inclination to adopt digital technologies early, innovate, pursue new digital opportunities, and accept calculated risks in digital settings (Covin and Wales, 2019; Nambisan et al., 2019; Touijer et al., 2026). Entrepreneurs high in this orientation tend to be more ready to redesign their processes, create new tourism services, and use digital platforms to enrich the customer experience (Touijer, Touijer and Elabjani, 2026). Such an orientation fosters ongoing experimentation and learning, which allows entrepreneurs to react better to fast-moving tourism markets (Savvinopoulou and Mylonas, 2026). In terms of dynamic capabilities, it reinforces the entrepreneur's ability to detect environmental changes and marshal resources for strategic adjustment (Teece, Pisano and Shuen, 1997). Entrepreneurs with a stronger digital entrepreneurial orientation are therefore expected to display greater tourism entrepreneurial agility, reacting faster to shifts in tourist preferences, technology, and destination competition.

2.3 AI Capability and Tourism Entrepreneurial Agility

AI capability denotes an entrepreneur's competence in applying artificial intelligence to support decisions, customer interactions, operational efficiency, and innovation (Dwivedi *et al.*, 2021; Mikalef and Gupta, 2021; Ganuthula, 2025). Rapid progress in AI has reshaped tourism entrepreneurship, allowing entrepreneurs to study customer behaviour, tailor tourism experiences, automate routine tasks, and fine-tune marketing (Bondareko et al., 2025). However, simply having AI tools does not guarantee better performance; entrepreneurs must also be able to embed AI in adaptive business practices (Usman *et al.*, 2024; Odugbesan, Tafamel and Akrawah, 2026). According to dynamic capability theory, technological resources generate competitive value only when firms reconfigure them in line with environmental changes (Teece, 2020). Therefore, entrepreneurs with greater AI capabilities are expected to exhibit higher tourism entrepreneurial agility, as AI strengthens their capacity to notice market shifts, decide promptly, and adjust tourism offerings quickly.

2.4 Opportunity Alertness and Tourism Entrepreneurial Agility

Opportunity alertness is the cognitive capacity of an entrepreneur to notice, assess, and act on new business opportunities before rivals become aware of them (Chavoushi *et al.*, 2021). Highly alert entrepreneurs keep watching customer preferences, technological progress, tourism trends, and market signals in search of worthwhile opportunities (Casanova et al., 2023). This capacity helps them anticipate uncertainty and take proactive strategic steps instead of only reacting once markets have changed (Odugbesan, Tafamel and Akrawah, 2026). In Dynamic Capability Theory, recognising opportunities is a core part of the sensing capability that comes before strategic adaptation (Teece et al., 1997). Entrepreneurs with greater opportunity alertness are therefore expected to build tourism entrepreneurial agility by quickly converting the opportunities they identify into adapted tourism products, new services, and competitive strategies.

2.5 Digital Entrepreneurial Orientation and Business Sustainability

Business sustainability describes an entrepreneur's capacity to stay economically viable over the long run while also generating social and environmental value that supports the ongoing development of the business (Bansal and DesJardine, 2014; Lutfi *et al.*, 2022). Earlier research suggests that entrepreneurs with a stronger digital entrepreneurial orientation are better able to use digital innovation to raise efficiency, reach more markets, and deepen customer relationships, all of which support sustainable performance (Nambisan et al., 2019). Other studies caution that digital orientation by itself may not guarantee sustainable outcomes because the gains from digitalisation hinge on the entrepreneur's continuing ability to adapt to a changing environment (Brenner, 2018; Xu et al., 2022). Digital entrepreneurial orientation is therefore expected to relate positively to business sustainability, and part of this relationship may run indirectly through tourism entrepreneurial agility.

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2.6 Opportunity Alertness and Business Sustainability

Entrepreneurs who are more alert to opportunities usually find it easier to identify new markets, foresee changes in customer demand, and act early on emerging tourism trends (Chavoushi *et al.*, 2021). This allows them to launch new products and services, widen their market reach, and reinforce their competitive position when conditions are dynamic (Li *et al.*, 2022; Casanova et al., 2023). In tourism destinations, recognising opportunities early helps businesses adapt and reduces the risks associated with uncertainty (Williams et al., 2021). Thus, opportunity alertness is expected to have a positive effect on the sustainability of tourism businesses run by women entrepreneurs.

2.7 Tourism Entrepreneurial Agility and Business Sustainability

Following Dynamic Capability Theory (Teece et al., 1997), TEA is defined in this study as entrepreneurial agility as it is expressed in tourism. It refers to an entrepreneur's capacity to detect changes in the tourism market, modify products and services, reorganise available resources, and introduce fitting responses when conditions shift. These capacities matter especially in tourism, where firms contend with volatile tourist demand, evolving visitor preferences, technological change, and inter-destination competition. TEA therefore describes how entrepreneurial agility is applied in tourism, without treating it as a separate kind of agility.

Relative to the general notion of entrepreneurial agility, TEA gives more weight to environmental triggers and adaptive responses that are specific to tourism, such as shifting tourist preferences, demand fluctuations, tourism technology, destination dynamics, and the continual need to revise tourism offerings. In this study, the tourism setting acts as the boundary condition within which entrepreneurial agility is operationalised.

Entrepreneurs with greater tourism entrepreneurial agility are in a better position to adjust their activities when tourism conditions change. Being able to modify offerings, reorganise resources, and react to new market conditions can foster operational flexibility, service innovation, and the ongoing viability of tourism firms (Karimi and Walter, 2021; Pennetta *et al.*, 2025). Agility can thus help tourism entrepreneurs sustain performance while coping with uncertainty and changing visitor needs, suggesting that TEA may contribute meaningfully to the sustainability of tourism businesses.

Conceptually, TEA sits between dynamic capability theory and the wider concept of entrepreneurial agility. The theory explains how firms deal with environmental change by sensing, seizing, and reconfiguring resources (Teece, Pisano and Shuen, 1997), while entrepreneurial agility broadly denotes the capacity to react quickly to changing conditions. TEA describes how this adaptive process unfolds in tourism entrepreneurship, where changes in tourist preferences, demand, technology, and destination conditions create the need for fast adjustment. Its contribution lies in a tourism-specific operationalisation of entrepreneurial agility, not in asserting a fundamentally different capability.

2.8 The Mediating Role of Tourism Entrepreneurial Agility

According to DCT, resources and entrepreneurial capabilities yield sustainable advantage only once they are converted into adaptive strategic actions (Teece et al., 1997). In tourism entrepreneurship, digital entrepreneurial orientation sets the strategic direction (Nambisan, Wright and Feldman, 2019), AI capability provides technological means (Mikalef and Gupta, 2021), and opportunity alertness supports the recognition of opportunities (Casanova et al., 2023). However, these capabilities are unlikely to produce sustainable outcomes on their own unless entrepreneurs are agile enough to keep revising tourism services, reorganising resources, and responding well to market changes (Warner and Wäger, 2019). Tourism Entrepreneurial Agility is thus proposed as the intervening mechanism linking digital entrepreneurial capabilities and opportunity alertness to business sustainability when tourism conditions change.

The three antecedents are not modelled in the same way with respect to business sustainability. For Digital Entrepreneurial Orientation and Opportunity Alertness, earlier research offers a theoretical basis for expecting both direct and indirect links with business sustainability (Nambisan, Wright and Feldman, 2019; Chavoushi et al., 2021). Both direct paths are therefore estimated (H4 and H5), and mediation for these relationships (H7 and H9) is judged by considering

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the direct and indirect paths together. AI Capability, by contrast, is treated as a technological resource that adds value to business outcomes only after it has been built into adaptive business practices (Mikalef and Gupta, 2021; Usman et al., 2024; Teece, 2020). In keeping with this resource-to-capability reasoning from Dynamic Capability Theory, no direct path from AI Capability to Business Sustainability is hypothesised; instead, the relationship is framed as a specific indirect effect via Tourism Entrepreneurial Agility (H8) and not as a conventional mediation hypothesis. H8 therefore tests whether the indirect path through TEA is significant, not whether TEA mediates a direct link between AI Capability and Business Sustainability.

Research Hypotheses

H1: *Digital entrepreneurial orientation is positively associated with tourism entrepreneurial agility.*
H2: *AI capability is positively associated with tourism entrepreneurial agility.*
H3: *Opportunity alertness is positively associated with tourism entrepreneurial agility.*
H4: *Digital entrepreneurial orientation is positively associated with business sustainability.*
H5: *Opportunity alertness is positively associated with business sustainability.*
H6: *Tourism entrepreneurial agility is positively associated with business sustainability.*
H7: *Tourism entrepreneurial agility mediates the relationship between digital entrepreneurial orientation and business sustainability.*
H8: *AI capability is positively and indirectly associated with business sustainability through tourism entrepreneurial agility (specific, indirect effect).*
H9: *Tourism entrepreneurial agility mediates the relationship between opportunity alertness and sustainability.*

3. METHODS

3.1 Research Design

A quantitative, cross-sectional survey design was used to investigate the relationships between digital entrepreneurial orientation, AI capability, opportunity alertness, tourism entrepreneurial agility, and business sustainability among women entrepreneurs in the Borobudur Priority Tourism Area, Indonesia. This design suited the aim of testing hypothesised links among latent constructs using partial least squares structural equation modelling (PLS-SEM). A structured questionnaire was administered from January to April 2026.

3.2 Participants and Sampling

Purposive sampling was used so that every respondent fit the aims of the research. To be eligible, respondents had to (1) be women running a tourism-related business, (2) have managed that business for two years or longer, (3) be 18 years of age or older, and (4) be located in the Borobudur Priority Tourism Area. Eligible businesses comprised homestays, culinary outlets, handicraft producers, souvenir shops, tour operators, and other businesses supporting tourism. In total, 300 questionnaires were circulated using both online and in-person methods: the online version was built in Google Forms and shared via WhatsApp, and paper versions were handed directly to qualifying business owners. Participants were reached through SME facilitators, SME communities, the researchers' own networks, and direct approaches by the research team. Of the 300 questionnaires, 295 came back (a 98.3% response rate). After screening against the eligibility criteria and checking for completeness, 23 responses were removed, leaving 272 usable questionnaires for analysis. The minimum sample size was calculated with the inverse square root method (Kock and Hadaya, 2018), which gives the number of cases needed to detect the smallest path coefficient expected to be significant at a chosen significance level and power, using $n_min > (z/|\beta_min|)^2$. With a conservative $|\beta_min|$ of 0.20, α = 5%, and 80% power, the required sample was $(2.486/0.20)^2$ = 154.5, rounded to 155, for one-tailed (directional) hypotheses, and $(2.802/0.20)^2$ = 196.3, rounded to 197, under the stricter two-tailed criterion. The 272 respondents thus exceeded both thresholds. Put the other way, a sample of 272 provides 80% power at the 5% level to detect path coefficients of roughly 0.151 (one-tailed) or 0.170 (two-tailed), both smaller than the weakest significant path

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found here (OA → TEA, β = 0.237). The sample size also meets common PLS-SEM recommendations (Hair and Alamer, 2022).

3.3 Ethical Considerations

Participation in the study was voluntary. Before completing the questionnaire, respondents were informed about the purpose of the research, their freedom to participate or decline, and the confidential handling of their answers, and every participant provided informed consent beforehand. No information capable of identifying individuals was gathered, and all responses were anonymised to safeguard privacy. The study followed widely accepted ethical standards for social science research.

3.4 Respondent Characteristics

Respondents also reported demographic and business details such as age, educational attainment, type of business, years of business experience, and business size. This information describes the women entrepreneurs running tourism-related businesses in the Borobudur Priority Tourism Area and aids in the interpretation of the results. Table 1 summarises these characteristics of the participants.

Table 1. Demographic Profile of Respondents

Characteristic	Category	Frequency	Percentage (%)
Age (years)	≤30	46	16.9
	31–40	82	30.1
	41–50	88	32.4
	>50	56	20.6
Education Level	Senior High School or below	94	34.6
	Diploma	38	14
	Bachelor's Degree	122	44.9
	Postgraduate	18	6.6
Business Experience	2–5 years	63	23.2
	6–10 years	79	29
	11–15 years	72	26.5
	>15 years	58	21.3
Business Type	Culinary	77	28.3
	Handicraft & Souvenir	61	22.4
	Homestay	43	15.8
	Tour Service	36	13.2
	Others	55	20.2
Number of Employees	1–5	171	62.9
	6–10	68	25
	>10	33	12.1
Total		**272**	**100**

Source: Survey data by the authors processed

Table 1 profiles the 272 participating women entrepreneurs. The largest age group was 41–50 years (32.4%), closely followed by 31–40 years (30.1%), so most participants were in their prime working years. Close to half (44.9%) held a bachelor's degree; 34.6% had senior high school education or less, 14.0% a diploma, and 6.6% a postgraduate qualification. In terms of experience, 29.0% had run their businesses for 6–10 years and 26.5% for 11–15 years, pointing to considerable entrepreneurial experience. Culinary businesses formed the largest category (28.3%), ahead of handicraft and souvenir businesses (22.4%), homestays (15.8%), tour services (13.2%), and other tourism-related businesses (20.2%). Most firms were micro or small: 62.9% had one to five

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employees, 25.0% had six to ten, and 12.1% had more than ten. The sample therefore covers a varied cross-section of women running tourism-related businesses in the Borobudur Priority Tourism Area.

3.5 Measurement of Variables

Measurement items were taken from established scales and adjusted to the setting of women-owned tourism businesses. Items for Digital Entrepreneurial Orientation were based on Covin and Wales (2019) and Nambisan et al., (2019), AI Capability on (Mikalef and Gupta, 2021), Opportunity Alertness on Casanova et al., (2023), and Business Sustainability on (Lutfi et al., 2022). Tourism Entrepreneurial Agility (TEA) was operationalised as entrepreneurial agility contextualised to tourism, guided by Dynamic Capability Theory (Teece et al.,, 1997). Responses for each construct were recorded on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Before data collection, three experts in entrepreneurship and tourism management examined the questionnaire for content validity and contextual fit of the items.

TEA items were developed through a context-specific adaptation procedure. Their conceptual domain came from entrepreneurial agility and Dynamic Capability Theory, chiefly the capacities to detect environmental change, modify business offerings, reorganise available resources, and react to new conditions (Teece, Pisano and Shuen, 1997). These domains were then tailored to women running tourism-related businesses by focusing on shifts in tourist demand and visitor preferences, modification of tourism products and services, reorganisation of business resources, and the introduction of new or innovative responses to changing tourism market conditions.

Four TEA items were written based on this basis. TEA1 addresses how quickly business notices change in tourist demand and visitor preferences; TEA2 concerns how quickly tourism products and services are adapted when market conditions shift; TEA3 refers to reorganising available resources when the tourism environment calls for adjustment; and TEA4 concerns how rapidly new or innovative responses are put into practice as market conditions change. These four items were kept because together they cover the main expressions of tourism-contextualized entrepreneurial agility while keeping the measure parsimonious. Item wording was deliberately tailored to tourism so that the indicators mirror the conditions tourism businesses actually face.

The three expert reviewers were chosen for their academic background and hands-on experience in entrepreneurship and the development of small and medium-sized enterprises (SMEs). Each was a university lecturer with a track record of assisting and mentoring SMEs, a mix of scholarly and practical knowledge judged appropriate for evaluating both the conceptual soundness of the items and their fit with tourism businesses. Working independently, the experts assessed the items, especially the newly developed TEA items, for relevance, clarity, and contextual suitability, and their comments were used to refine item wording and presentation before the main survey. Since this review was qualitative, it offers a preliminary check of content validity and contextual relevance rather than a quantitative content validity index. Accordingly, this study presents initial validity evidence for a tourism-contextualized operationalisation of entrepreneurial agility and does not claim to have fully validated a new construct.

TEA was modelled as a reflective construct, since its indicators are viewed as observable outcomes of an underlying agility capability and not as separate components that jointly make up the construct. Each of the four indicators (detecting changes in tourism market conditions, adapting tourism products and services, reorganising available resources, and introducing new or innovative responses) expresses the same latent capability. These expressions should move together because an entrepreneur with greater underlying agility typically displays several forms of adaptive behaviour at once. Therefore, the indicators are not treated as independent resources or distinct dimensions that must all be present for TEA to exist; rather, they mirror a shared capacity to react quickly and appropriately to changes in tourism conditions. Thus, variation in this latent capacity should appear as a corresponding variation across all four indicators, which justifies the reflective specification.

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3.6 Data Collection Procedure

The structured questionnaire was administered between January and April of 2026. Respondents were first briefed on the aims of the study, voluntary participation, and confidentiality of their answers. Only fully completed questionnaires from respondents who satisfied the sampling criteria were retained for analysis.

3.7 Common Method Bias

Because all data came from single respondents reporting on themselves, both procedural and statistical steps were taken to gauge the risk of common method bias (Podsakoff *et al.*, 2024). On the procedural side, respondents were assured that participation was voluntary, that their answers would remain confidential and anonymous, and that no identifying details were requested. On the statistical side, Harman's single-factor test showed that the first factor explained 28.37% of the total variance, under the 50% cut-off, implying that common method bias was unlikely to distort the results materially. A full collinearity check of construct-level variance inflation factors (VIF) was also performed. As Table 6 shows, these values lay between 1.736 and 2.284, all under the 3.3 benchmark, further indicating that common method bias did not seriously threaten the findings.

3.8 Data Analysis

Analysis was carried out with PLS-SEM in SmartPLS 4, following the steps outlined by Hair and Alamer (2022). The measurement model was checked for indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. The structural model was then examined through path coefficients, the coefficient of determination (R^2), and bootstrapping with 5,000 resamples to test the hypotheses and the specific indirect effects via Tourism Entrepreneurial Agility. For H7 and H9, where direct and indirect paths were both estimated, the mediation type was established by considering the significance of the two effects together. For H8, since the model contains no direct AI Capability–Business Sustainability path, only the specific indirect effect was assessed, and it was not read as conventional mediation.

4. RESULTS

4.1 Measurement Model Assessment

Table 2 reports the indicator reliability, internal consistency reliability, and convergent validity of the measurement model. Every outer loading was above the 0.70 benchmark (range 0.703–0.910), indicating acceptable indicator reliability (Hair and Alamer, 2022). Internal consistency was also good: Cronbach's alpha ranged between 0.803 and 0.876 and composite reliability (CR) between 0.870 and 0.916, all above 0.70. Average Variance Extracted (AVE) values of 0.627 to 0.731 exceeded the 0.50 minimum, establishing convergent validity (Fornell and Larcker, 1981). The measurement model is therefore reliable and convergently valid, providing a sound basis for estimating the structural links among digital entrepreneurial orientation, AI capability, opportunity alertness, tourism entrepreneurial agility, and business sustainability.

For the tourism-contextualized TEA measure, the results support reliability and convergent validity. Its loadings ranged from 0.775 to 0.896, all above the threshold; its Cronbach's alpha was 0.876 and its composite reliability 0.916; and its AVE reached 0.731. The TEA indicators therefore adequately capture the underlying tourism-contextualized agility capability.

Table 2. Outer loadings

Construct	Code	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
Digital Entrepreneurial Orientation (DEO)	DEO1	0.804	**0.814**	**0.877**	**0.641**
	DEO2	0.771			
	DEO3	0.787			
	DEO4	0.838			
AI Capability (AIC)	AIC1	0.885	**0.838**	**0.893**	**0.677**
	AIC2	0.873			

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	AIC3	0.703			
	AIC4	0.816			
Opportunity Alertness (OA)	OA1	0.841	**0.803**	**0.870**	**0.627**
	OA2	0.820			
	OA3	0.741			
	OA4	0.762			
Tourism Entrepreneurial Agility (TEA)	TEA1	0.848	**0.876**	**0.916**	**0.731**
	TEA2	0.896			
	TEA3	0.775			
	TEA4	0.896			
Business Sustainability (BS)	BS1	0.769	**0.853**	**0.902**	**0.697**
	BS2	0.786			
	BS3	0.866			
	BS4	0.910			

Source: Survey data by the authors processed

4.2 Discriminant Validity

Table 3 shows the Fornell–Larcker test of discriminant validity. For every construct, the square root of the AVE was larger than its correlations with the remaining constructs, meeting the criterion (Fornell and Larcker, 1981). In other words, the diagonal values exceeded the off-diagonal inter-construct correlations, meaning each construct had more variance in common with its own indicators than with any other latent variable. The constructs can thus be regarded as conceptually and empirically distinct, which further supports the adequacy of the measurement model before the structural model is examined.

Table 3. Discriminant Validity (Fornell-Larcker Criterion)

No.	Construct	(1)	(2)	(3)	(4)	(5)
1	Digital Entrepreneurial Orientation (DEO)	**0.801**				
2	AI Capability (AIC)	0.574	**0.823**			
3	Opportunity Alertness (OA)	0.523	0.486	**0.792**		
4	Tourism Entrepreneurial Agility (TEA)	0.644	0.601	0.559	**0.855**	
5	Business Sustainability (BS)	0.438	0.465	0.661	0.714	**0.835**

Source: Survey data by the authors processed

As a further test, discriminant validity was checked with the Heterotrait–Monotrait ratio (HTMT), reported in Table 4. The HTMT values ranged between 0.521 and 0.811, under the 0.90 threshold, which confirms discriminant validity (Schuberth *et al.*, 2023). The constructs are therefore empirically separable, and the measurement model shows sufficient construct validity to proceed to the structural analysis.

Table 4. Heterotrait-Monotrait Ratio (HTMT)

Construct	DEO	AIC	OA	TEA	BS
Digital Entrepreneurial Orientation (DEO)	-				
AI Capability (AIC)	0.658	-			
Opportunity Alertness (OA)	0.594	0.552	-		
Tourism Entrepreneurial Agility (TEA)	0.744	0.701	0.668	-	
Business Sustainability (BS)	0.521	0.548	0.718	0.811	-

Source: Survey data by the authors processed

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4.3 Structural Model Assessment

Prior to testing the structural paths, collinearity among predictors was examined using the variance inflation factor (VIF). Table 5 shows the VIF values between 1.591 and 2.146, comfortably below the cut-offs of 3.3 (Kock and Hadaya, 2018) and 5.0 (Hair and Alamer, 2022). Therefore, multicollinearity was not a problem, and the predictors were distinct enough to yield stable, unbiased path estimates; thus, the model was suitable for hypothesis testing.

Table 5. Collinearity Assessment (Variance Inflation Factor)

Endogenous Construct	Predictor Construct	VIF
Tourism Entrepreneurial Agility (TEA)	Digital Entrepreneurial Orientation (DEO)	1.842
	AI Capability (AIC)	1.763
	Opportunity Alertness (OA)	1.591
Business Sustainability (BS)	Digital Entrepreneurial Orientation (DEO)	1.784
	Opportunity Alertness (OA)	1.648
	Tourism Entrepreneurial Agility (TEA)	2.146

Source: Survey data by the authors processed

A full-collinearity test was also conducted as an additional check for common method bias, computing VIF values for every construct in the model. Table 6 shows that these values lay between 1.736 and 2.284, all beneath the 3.3 benchmark, suggesting that common method bias is not a serious threat to the validity of the results.

Table 6. Full-Collinearity Assessment (Variance Inflation Factor)

Construct	Full-collinearity VIF
Digital Entrepreneurial Orientation	**1.927**
AI Capability	**1.814**
Opportunity Alertness	**1.736**
Tourism Entrepreneurial Agility	**2.284**
Business Sustainability	**2.173**

Note: VIF values below 3.3 indicate that common method bias is unlikely to pose a serious threat to the validity of the results.
Source: Survey data processed by the authors using SmartPLS 4.

Table 7 reports the coefficient of determination (R^2), used to judge the model's explanatory power. Together, digital entrepreneurial orientation, AI capability, and opportunity alertness account for 58.4% of the variance in tourism entrepreneurial agility, while digital entrepreneurial orientation, opportunity alertness, and tourism entrepreneurial agility account for 69.1% of the variance in business sustainability. This represents moderate explanatory power for TEA and moderate-to-substantial explanatory power for BS.

Table 7. Coefficient of Determination (R^2)

Endogenous Construct	R^2	Interpretation
Tourism Entrepreneurial Agility	0.584	Moderate
Business Sustainability	0.691	Moderate to substantial

Source: Survey data by the authors processed

Figure 1 depicts the SmartPLS 4 structural model with its standardised path coefficients, outer loadings, and R^2 values for the endogenous constructs. Digital EO, AI capability, and opportunity alertness are jointly linked to tourism entrepreneurial agility, which in turn is linked to business sustainability. Digital EO and opportunity alertness also have direct paths to business sustainability, whereas AI capability does not; in line with H8, its relationship with business sustainability is assessed solely as a specific indirect path via TEA. The model explains 58.4% of the

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variance in TEA and 69.1% in BS, that is, moderate and moderate-to-substantial explanatory power, respectively. Figure 1 summarises the structural relationships, while the significance tests for the direct and specific indirect paths appear in Tables 8 and 9.

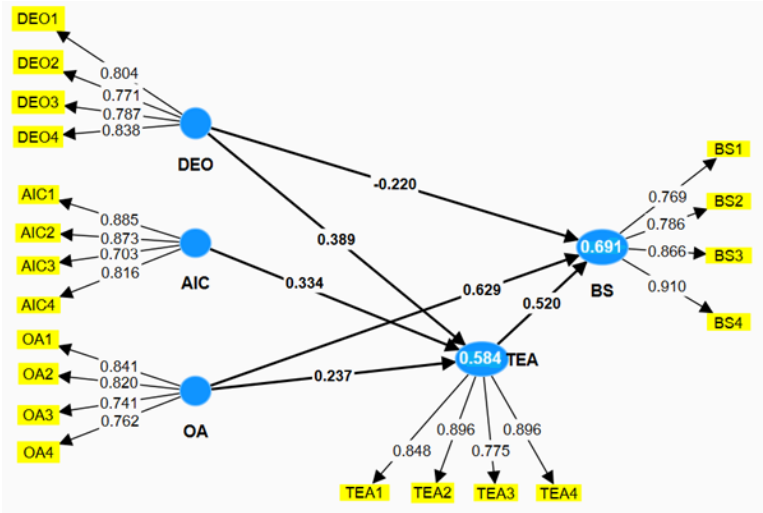


Figure 1. Structural Model Results

Note: *The model does not include a direct AIC → BS path. Consistent with H8, the AIC–BS relationship was examined as a specific indirect path through TEA.*

4.4 Hypothesis Testing

The hypotheses were tested using bootstrapping in SmartPLS 4, with the results presented in Table 8. Five of the six direct hypotheses were supported. Digital entrepreneurial orientation had a significant positive association with tourism entrepreneurial agility (β = 0.389, p < 0.001), indicating that entrepreneurs reporting a stronger digital orientation also tended to report more adaptive capability in a fast-changing tourism setting. AI capability was also positively and significantly linked to TEA (β = 0.334, p < 0.001), so higher AI capability went together with stronger agility under dynamic conditions. Opportunity alertness showed a significant positive link with TEA (β = 0.237, p < 0.001), with more alert entrepreneurs displaying greater adaptive capability. TEA, in turn, was positively and significantly related to business sustainability (β = 0.520, p < 0.001), pointing to a positive statistical relationship between agility and the sustainability of tourism businesses. Opportunity alertness also had a significant positive direct association with business sustainability (β = 0.629, p < 0.001). However, the direct link between digital entrepreneurial orientation and business sustainability did not reach significance (β = –0.220, p = 0.086).

Although not significant, the negative sign of the DEO–BS coefficient deserves comment. In the estimated model, the direct DEO–BS association was negative, whereas the indirect association via TEA was positive and significant (β = 0.202, p < 0.001). Opposing signs of this kind can point to an inconsistent or competitive pattern between direct and indirect associations. However, since the direct path was not significant, the negative coefficient does not show that digital entrepreneurial orientation lowers business sustainability. A more reasonable interpretation is that the link between digital orientation and sustainability hinges on the adaptive capability through which that orientation is turned into concrete business responses.

Table 8. Results of Direct Effects and Effect Size Assessment

Relationship	β	t-value	p-value	95% CI Lower	95% CI Upper	f^2	Decision
DEO → TEA	0.389	6.842	<0.001	0.276	0.497	0.172	**Supported**
AIC → TEA	0.334	5.914	<0.001	0.225	0.437	0.129	**Supported**
OA → TEA	0.237	3.985	<0.001	0.13	0.34	0.078	**Supported**

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TEA → BS	0.52	8.903	<0.001	0.414	0.622	0.332	**Supported**
OA → BS	0.629	9.741	<0.001	0.527	0.72	0.487	**Supported**
DEO → BS	−0.220	1.718	0.086	−0.472	0.032	0.048	**Not Supported**

Source: Survey data by the authors processed

The bootstrapped confidence intervals reinforce these conclusions. None of the 95% intervals for the significant paths contained zero, whereas the interval for DEO → BS (-0.472 to 0.032) did, matching its nonsignificant p-value (p = 0.086). Effect sizes reveal differences in how much each predictor contributes. The f^2 values ranged from 0.048 to 0.487; the strongest effect was that of opportunity alertness on business sustainability (f^2 = 0.487), followed by TEA on business sustainability (f^2 = 0.332). The effects of digital entrepreneurial orientation (f^2 = 0.172), AI capability (f^2 = 0.129), and opportunity alertness (f^2 = 0.078) on TEA show different degrees of contribution within the model.

Table 9 presents the bootstrapped indirect effects via tourism entrepreneurial agility. Digital entrepreneurial orientation, AI capability, and opportunity alertness all showed significant indirect associations with business sustainability through TEA. For digital entrepreneurial orientation, the indirect association was positive and significant; given that its direct path to BS was nonsignificant, this corresponds to indirect-only mediation and supports H7. AI capability also displayed a significant positive indirect association with business sustainability via TEA. Since the model does not include a direct AI capability–business sustainability path, this result supports H8 as a specific indirect effect and is not treated as conventional mediation. Opportunity alertness likewise had a significant indirect association with business sustainability via TEA; because its direct association with BS was also significant, the pattern reflects complementary (partial) mediation, supporting H9. Overall, these results underline the usefulness of tourism-contextualized TEA as an operationalisation of entrepreneurial agility in accounting for the statistical links between the antecedents and business sustainability among women entrepreneurs.

Table 9. Specific Indirect Effects through Tourism Entrepreneurial Agility

Indirect Relationship	β	t-value	p-value	95% CI Lower	95% CI Upper	Decision
DEO → TEA → BS	0.202	4.782	<0.001	0.126	0.291	**Supported**
AIC → TEA → BS	0.174	4.116	<0.001	0.103	0.259	**Supported**
OA → TEA → BS	0.123	3.274	0.001	0.047	0.211	**Supported**

Source: Survey data by the authors processed

All three indirect effects had 95% confidence intervals lying wholly above zero, which further confirms their significance. Because direct paths to Business Sustainability were also estimated for DEO → TEA → BS and OA → TEA → BS, these effects can be classified as indirect-only and complementary (partial) mediation, respectively. No direct path was estimated for AIC → TEA → BS; therefore, the result is a specific indirect effect (H8) and not conventional mediation.

5. DISCUSSION

The results show a significant positive association between digital entrepreneurial orientation and tourism entrepreneurial agility among women running tourism-related businesses in the Borobudur Priority Tourism Area. Entrepreneurs who described themselves as more digitally oriented also reported a greater capacity to take up digital technologies, innovate, and act ahead of shifts in the tourism market. This pattern accords with Dynamic Capability Theory (Teece, Pisano and Shuen, 1997), which implies that a digital entrepreneurial orientation may help entrepreneurs detect environmental change and keep reorganising resources to stay competitive. It also echoes earlier work linking digital orientation with adaptability and innovation in dynamic settings (Nambisan et al., 2019). In tourism, this adaptive capacity takes the form of TEA, reflecting women

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entrepreneurs' reported ability to revise their products, services, and customer experiences as visitor expectations change.

The focus on women entrepreneurs defines the population and context of the study; it does not imply a gender-specific mechanism. Whether gender-related characteristics moderate or account for the relationships among the five constructs was not tested here, so the results should not be taken to mean that these relationships are unique to women. What the focus provides is evidence from one particular group of entrepreneurs running tourism-related businesses in the Borobudur Priority Tourism Area. Subsequent research could compare women and men entrepreneurs or directly investigate gender-related factors that might influence entrepreneurial agility and business sustainability.

AI Capability followed a similar pattern, being significantly and positively associated with TEA. Higher AI capability thus appears to go hand in hand with better decision-making, smoother operations, and a clearer grasp of customer needs. Dynamic Capability Theory holds that technology becomes strategically valuable once entrepreneurs can weave it into adaptive business processes (Teece et al., 1997). The result is in line with earlier evidence that AI capability relates to organizational agility through better information processing and faster reactions to environmental change (Mikalef and Gupta, 2021). AI Capability can therefore be understood as more than a technological asset: it is a resource closely tied to adaptive capability in tourism entrepreneurship.

Opportunity Alertness produced a comparable result. Entrepreneurs who reported being more alert to new market opportunities also reported higher TEA, which fits the argument that alert entrepreneurs are better at anticipating shifts in tourist preferences and responding to market dynamics. This is in keeping with Entrepreneurial Alertness Theory, which treats opportunity recognition as a core entrepreneurial capability that comes before strategic action (Casanova et al., 2023). In Dynamic Capability terms, recognising opportunities forms the sensing capability that allows entrepreneurs to start adapting in good time (Teece et al., 1997). Thus, women entrepreneurs with greater opportunity alertness may be better placed to redesign their tourism offerings, add innovative services, and stay competitive as tourism environments grow more dynamic.

The Borobudur Priority Tourism Area offers a meaningful backdrop for reading these results. Businesses there face shifting visitor demand, changing tourism trends, competition among destinations, and evolving visitor expectations, conditions under which the ability to notice market changes and adjust offerings and resources is central to entrepreneurial agility. The significant links among Opportunity Alertness, TEA, and Business Sustainability may therefore reflect how much adaptive capability matters for entrepreneurs in such a dynamic destination. These contextual features, however, were not measured as variables. Borobudur should thus be seen as the empirical setting of the study, not as an explanatory factor that was tested. Research in other destinations can check whether the relationships observed here hold under different destination characteristics and tourism conditions.

The link between digital entrepreneurial orientation and business sustainability followed a different pattern. While DEO was positively and significantly related to TEA, its direct relationship with business sustainability was not significant ($\beta = -0.220$, $p = 0.086$). The negative direct coefficient adds nuance, but since it is not significant, it cannot be taken as evidence that DEO harms business sustainability. The opposite signs of the direct and indirect associations may instead reflect an inconsistent or competitive pattern, in which DEO relates to business sustainability differently depending on whether the direct route or the route via TEA is considered. The significant positive indirect association via TEA ($\beta = 0.202$, $p < 0.001$) implies that whether digital orientation contributes to sustainability may depend on the entrepreneur's ability to convert it into adaptive action. Such an interpretation fits Dynamic Capability Theory, which stresses turning strategic orientations and resources into capabilities that allow adaptation to changing conditions (Teece, Pisano and Shuen, 1997). However, given the cross-sectional design, this pattern represents a statistical relationship and not evidence of a temporal or causal process.

In contrast to DEO, both Opportunity Alertness and TEA had significant positive direct associations with business sustainability: entrepreneurs who reported greater alertness and agility also reported more sustainable businesses. From a dynamic capability viewpoint, this fits the

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argument that reorganising resources, raising service quality, and reacting swiftly to changes in tourist demand are essential for the ongoing viability of tourism firms. In other words, sustainability appears to be tied not only to spotting opportunities but also to the capacity to act on them, which further underlines the importance of TEA as a tourism-contextualised form of entrepreneurial agility closely related to business sustainability.

Turning to indirect effects, Digital Entrepreneurial Orientation, AI Capability, and Opportunity Alertness each showed significant indirect associations with Business Sustainability via TEA, which are interpreted in line with how the model was specified. For DEO, a significant indirect association alongside a nonsignificant direct one indicates indirect-only mediation (H7). For Opportunity Alertness, the direct and indirect associations were both positive and significant, indicating complementary (partial) mediation (H9). For AI Capability, no direct path to Business Sustainability was estimated; thus, the finding supports H8 as a specific indirect effect rather than conventional mediation. Overall, the evidence is in line with the view that digital entrepreneurial resources and capabilities relate to business sustainability chiefly through entrepreneurs' adaptive capabilities. The combination of a nonsignificant direct DEO effect and a significant indirect effect via TEA, in particular, points to a key role for TEA in connecting strategic orientation with sustainable outcomes.

These results lend empirical weight to the idea of a tourism-contextualized form of entrepreneurial agility. They do not suggest that TEA is a separate kind of agility; rather, they show that entrepreneurial agility assumes a particular shape in tourism businesses confronted with changing visitor demand, technological conditions, and destination competition. The study thereby adds to the entrepreneurial agility literature by illustrating how the general capacity to respond to environmental change can be operationalised under the specific conditions of tourism entrepreneurship. At the same time, the findings warrant caution and do not offer a single, definitive account of business sustainability. The fact that DEO had no significant direct association with business sustainability, despite a significant indirect association via TEA, suggests that digital orientation does not automatically result in sustainable outcomes. Other possible explanations include how far digital practices are embedded in day-to-day operations, entrepreneurs' access to complementary resources, and their ability to turn digital orientation into adaptive action.

In line with the formulation of H8, the structural model contains no direct path from AI capability to business sustainability. The AI capability finding therefore shows a significant specific indirect association but cannot reveal whether TEA fully or partially explains a direct AI capability–business sustainability relationship. The results should also be read with the single-informant, self-reported nature of the data in mind, which may give rise to common method bias even though procedural and statistical checks were carried out. Moreover, the cross-sectional design means that temporal order and causal mechanisms cannot be established. Future studies would benefit from longitudinal, multi-source designs that explicitly estimate the relevant direct and indirect paths to clarify how digital orientation, AI capability, opportunity alertness, and entrepreneurial agility relate to business sustainability.

6. CONCLUSION

This study investigated how Digital Entrepreneurial Orientation, AI Capability, Opportunity Alertness, Tourism Entrepreneurial Agility, and Business Sustainability are related among women entrepreneurs in the Borobudur Priority Tourism Area. DEO, AI capability, and opportunity alertness were all positively and significantly associated with TEA, and both opportunity alertness and TEA were positively and significantly associated with business sustainability. The direct link between DEO and business sustainability was negative but not significant, while its indirect link via TEA was positive and significant. AI capability likewise had a significant specific indirect association with business sustainability via TEA; because no direct AI Capability–Business Sustainability path was estimated, this is interpreted as a specific indirect effect and not as conventional mediation.

Overall, the evidence supports the relevance of agility in tourism. TEA is not presented as a wholly separate agility capability; instead, the findings show how entrepreneurial agility takes shape in tourism firms coping with changing visitor demand, technology, and destination competition. In

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doing so, this study extends the application of Dynamic Capability Theory by showing how entrepreneurial and technological capabilities relate to Business Sustainability through an adaptive capability rooted in tourism entrepreneurship. For tourism stakeholders, the results suggest that strengthening women entrepreneurs' adaptive capabilities can help sustain tourism-related businesses. As the design was cross-sectional, the results describe statistical associations and do not demonstrate causality.

Limitations and Future Research

Several limitations should be considered when interpreting these results. First, the study combined a cross-sectional design with purposive sampling and concentrated on women running tourism-related businesses in the Borobudur Priority Tourism Area. A cross-sectional design cannot establish the temporal order among DEO, AI Capability, Opportunity Alertness, TEA, and Business Sustainability; therefore, the relationships reported here are associations, not causal effects. Furthermore, purposive sampling and the narrow geographic and population focus restrict how far the results can be generalised to other groups of entrepreneurs, other sectors, and other destinations. Second, the data came from single informants reporting on themselves.

Although procedural and statistical steps were taken to assess common method bias, some degree of response bias cannot be ruled out entirely. Later studies could draw on multiple data sources, objective performance indicators, or several informants per business to make the findings more robust. In addition, in keeping with its theoretical rationale, the model omitted a direct path from AI Capability to Business Sustainability, and H8 was accordingly framed and tested as a specific indirect effect. The study therefore cannot determine whether AI Capability is also directly associated with Business Sustainability or whether TEA fully or partly explains such a link.

Estimating this direct path in future studies would allow conventional mediation to be tested. Third, TEA was operationalised as entrepreneurial agility contextualised to tourism, and this study offers preliminary validity evidence for this operationalisation rather than a fully validated new construct. Although experts helped develop and review the items, further validation with independent samples, other tourism settings, and established entrepreneurial agility scales is required to judge the stability and generalisability of the measure. Longitudinal designs that explicitly estimate the relevant direct and indirect paths would also provide firmer evidence of the temporal relationships and mechanisms connecting digital orientation, AI capability, opportunity alertness, entrepreneurial agility, and business sustainability.

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APPENDIX.

Construct	Code	Measurement Item	Theoretical Foundation	Scale Source / Development
Digital Entrepreneurial Orientation (DEO)	DEO1	Our business actively adopts new digital technologies to improve its tourism products and services.	Entrepreneurial Orientation; Digital Entrepreneurship	Adapted from Covin & Wales (2019); Nambisan et al. (2019)
	DEO2	Our business proactively uses digital technologies to identify and respond to emerging tourism markets.	Entrepreneurial Orientation; Digital Entrepreneurship	Adapted from Covin & Wales (2019); Nambisan et al. (2019)
	DEO3	Our business is willing to experiment with new digital approaches, even when the outcomes are uncertain.	Entrepreneurial Orientation; Digital Entrepreneurship	Adapted from Covin & Wales (2019); Nambisan et al. (2019)
	DEO4	Our business takes the initiative to use digital technologies to respond to changes in the tourism market.	Entrepreneurial Orientation; Digital Entrepreneurship	Adapted from Covin & Wales (2019); Nambisan et al. (2019)
AI Capability (AIC)	AIC1	Our business has access to the technological resources required to use artificial intelligence in its activities.	Dynamic Capability Theory; AI Capability	Adapted from Mikalef & Gupta (2021)
	AIC2	Our business has the skills required to effectively use artificial intelligence in business activities.	Dynamic Capability Theory; AI Capability	Adapted from Mikalef & Gupta (2021)
	AIC3	Our business has the knowledge required to integrate artificial intelligence into business processes.	Dynamic Capability Theory; AI Capability	Adapted from Mikalef & Gupta (2021)
	AIC4	Our business can use artificial intelligence to support decision-making and improve business operations.	Dynamic Capability Theory; AI Capability	Adapted from Mikalef & Gupta (2021)
Opportunity Alertness (OA)	OA1	I regularly observe changes in the tourism market that may create new business opportunities.	Entrepreneurial Alertness Theory	Adapted from Casanova et al. (2023)

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	OA2	I can recognise unmet needs or changing preferences among tourists.	Entrepreneurial Alertness Theory	Adapted from Casanova et al. (2023)
	OA3	I can identify new tourism business opportunities before they become apparent to competitors.	Entrepreneurial Alertness Theory	Adapted from Casanova et al. (2023)
	OA4	I actively seek information that may indicate emerging opportunities for my tourism business.	Entrepreneurial Alertness Theory	Adapted from Casanova et al. (2023)
Tourism Entrepreneurial Agility (TEA)	TEA1	Our business quickly recognises changes in tourist demand and visitor preferences.	Dynamic Capability Theory	Developed for this study; contextualized from entrepreneurial agility
	TEA2	Our business quickly adapts tourism products and services when the tourism market conditions change.	Dynamic Capability Theory	Developed for this study; contextualized from entrepreneurial agility
	TEA3	Our business can reconfigure available resources when changes in the tourism environment require adjustments.	Dynamic Capability Theory	Developed for this study; contextualized from entrepreneurial agility
	TEA4	Our business can rapidly implement new or innovative responses to changing tourism market conditions.	Dynamic Capability Theory	Developed for this study; contextualized from entrepreneurial agility
Business Sustainability (BS)	BS1	Our business can maintain its financial performance over time.	Business Sustainability / Sustainability Perspective	Adapted from Lutfi et al. (2022)
	BS2	Our business can maintain its operations despite changes in the tourism environment.	Business Sustainability / Sustainability Perspective	Adapted from Lutfi et al. (2022)
	BS3	Our business can maintain its competitiveness in the tourism market over time.	Business Sustainability / Sustainability Perspective	Adapted from Lutfi et al. (2022)
	BS4	Our business has good prospects for continued operations and growth in the future.	Business Sustainability / Sustainability Perspective	Adapted from Lutfi et al. (2022)

Note: *All measurement items were assessed using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. DEO, AIC, OA, and BS items were adapted from established scales and contextualised for women-owned tourism businesses.*
The TEA items were developed for this study based on Dynamic Capability Theory and contextualised to tourism entrepreneurship. The TEA items were reviewed by three experts in entrepreneurship and tourism management for relevance, clarity, and contextual appropriatenes.