



Enhancing Sustainability of Women-Led Rural Tourism MSMEs through Foreign Language Education, Digital Literacy, and Learning Agility

Firinta Togatorop^{1*}, Doris Yolanda Saragih¹, Hengki Mangiring Parulian Simarmata¹

¹ Administrasi Perkantoran, Politeknik Bisnis Indonesia, Pematangsiantar, Indonesia

*Corresponding author email: firintatogatorop@gmail.com

Article Info

Article history:

Received Augustus 05, 2025
Approved September 12, 2025

Keywords:

Women entrepreneurs;
MSME sustainability;
Foreign language; Digital
literacy; Learning agility

ABSTRACT

This study explores the influence of foreign language proficiency, digital literacy, and learning agility on the sustainability of women-led MSMEs in rural tourism, with digital literacy as a mediator and learning agility as a moderator. Guided by the Theory of Planned Behavior, Social Cognitive Theory, and Human Capital Theory, a quantitative explanatory design was employed using PLS-SEM on data from 300 women entrepreneurs in Samosir, Indonesia. Findings indicate that foreign language proficiency does not directly predict sustainability ($\beta = 0.082$; $p = 0.080$) but has a strong indirect effect via digital literacy ($\beta = 0.393$; $p < 0.001$). Language skills act as enablers rather than stand-alone drivers. Foreign language significantly enhances digital literacy ($\beta = 0.837$; $p < 0.001$), which in turn strongly predicts MSME sustainability ($\beta = 0.469$; $p < 0.001$). Learning agility also directly contributes ($\beta = 0.414$; $p < 0.001$) but does not moderate the language-sustainability link ($\beta = -0.011$; $p = 0.238$). The study advances theory by identifying digital literacy as a mediator and learning agility as an independent enabler. Practically, it recommends integrated, culturally grounded training. The primary limitation is its single-regional focus, suggesting future cross-regional, longitudinal, and conditional modeling.

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How to cite: Togatorop, F., Saragih, D. Y., & Simarmata, H. M. P. (2025). Enhancing Sustainability of Women-Led Rural Tourism MSMEs through Foreign Language Education, Digital Literacy, and Learning Agility. *Jurnal Ilmiah Global Education*, 6(4), 2474–2488. <https://doi.org/10.55681/jige.v6i4.4444>

INTRODUCTION

Women-led micro, small, and medium enterprises (MSMEs) are essential for building inclusive and sustainable local economies, particularly in rural tourism regions, where cultural capital and local innovation are central to business models (Torres et al., 2023; Zulkieflimansyah Zulkieflimansyah et al., 2024). In Indonesia, these enterprises not only enhance household income but also contribute significantly to regional economic vitality, especially in marginalized and indigenous communities. However, persistent challenges, such as digital exclusion,

linguistic barriers, rigid gender norms, and limited adaptability, continue to restrict women entrepreneurs from fully engaging in digital transformation (Shaikh & Zakaria, 2022).

Recent developments in the field of digital entrepreneurship and women's empowerment have shown the need for integrated skill development approaches. Among these, foreign language education is increasingly recognized as a strategic tool to help women entrepreneurs access international markets, navigate online platforms, and engage in intercultural collaboration (Riznar & Puntar, 2023; Tomé et al., 2022). When language learning incorporates local wisdom, such as through BIPA programs or culturally rooted vocabulary training, it enhances relevance, engagement, and confidence among rural women (PRASANTY & NURLINA, 2024; Santika et al., 2022).

Simultaneously, digital literacy, particularly when contextualized within indigenous knowledge systems, has become a critical enabler for women to digitize operations, develop branding narratives, and sustain business performance in volatile markets (Kasim, 2024; Nurjannah et al., 2022). Despite its importance, adoption remains uneven due to gendered access gaps, lack of tailored training, and deeply embedded sociocultural norms (Fauzia & Hidayati, 2023; Muhammad et al., 2024).

A considerable amount of literature has been published on the role of foreign language education, digital literacy, and entrepreneurship capabilities in enhancing MSME performance. However, relatively few studies have explicitly integrated these dimensions in the context of women-led MSMEs operating in rural tourism economies, particularly in developing countries. This literature review synthesizes the theoretical underpinnings, empirical findings, and critical gaps in the current study.

This research draws primarily from the Theory of Planned Behavior (TPB) (Ajzen, 2020), which posits that individual behavior is guided by attitudes, subjective norms, and perceived behavioral control. In entrepreneurship contexts, TPB helps explain how perceived competence, such as language proficiency or digital familiarity, shapes women's intentions to sustain and grow enterprises (Braojos-Gomez et al., 2015; Oraif, 2024). Numerous studies have applied TPB to examine start-up behavior and technology adoption in MSMEs, reinforcing its relevance. In addition to TPB, this study is informed by Social Cognitive Theory (Bandura, 1986; Grusec, 1992), which highlights the influence of self-efficacy in shaping behavior. In this context, foreign language acquisition is not only a cognitive skill, but also a psychosocial enabler of confidence in managing intercultural transactions and navigating digital platforms (Arce & Valdivia, 2020).

Complementing this is Human Capital Theory (Becker et al., 2022), which conceptualizes language and digital skills as investments that enhance productivity and market participation. Riznar & Puntar (2023) argued that multilingual capacity can serve as a form of capital, enabling access to broader trade networks and e-marketplaces. Thus, this study builds on and extends these three theoretical pillars by incorporating their interaction in a model of MSME sustainability led by women in the tourism sector.

To date, most research has examined foreign language and digital literacy as separate predictors, with little exploration of how they interact to influence sustainable entrepreneurship, particularly among women in the rural tourism sector. Even more limited is Empirical research integrates the construct of learning agility, defined as one's ability to learn, unlearn, and relearn in response to changing contexts (Das, 2024; De Vita, 2023). This represents a significant research gap in the understanding of how adaptive cognitive traits moderate the relationship between digital competence and business sustainability.

In rural Indonesian regions such as Samosir, Lake Toba, and Banyuwangi, women entrepreneurs are increasingly navigating the tension between traditional cultural roles and digital innovation pressures. Although many possess deep cultural resources, they often lack access to holistic programs that integrate language, digital, and adaptive skills. The absence of integrative models limits their ability to grow and sustain MSMEs in tourism-driven economies (Zulkieflimansyah Zulkieflimansyah et al., 2024).

This study builds on these limitations and contributes to the literature by proposing a novel, integrative framework.

1. Exploring the effect of foreign language education and digital literacy on the sustainability of women-led MSMEs
2. Examines digital literacy as a mediating mechanism between foreign language education and the sustainability of women-led MSMEs; and
3. Tests of whether learning agility moderates the relationship between foreign language education and the sustainability of women-led MSMEs.

To address these objectives, this study employs a quantitative explanatory approach using partial least squares structural equation Modeling (PLS-SEM). A total of 300 valid responses were collected from women entrepreneurs in Samosir Regency, representing sectors such as culinary arts, handicrafts, homestays, and tourism. Data were gathered through structured questionnaires with measurement instruments adapted from the validated scales. This methodological approach is well-suited for testing mediating and moderating relationships in models involving latent constructs, aligning with the study's aim to provide both theoretical insight and practical guidance for women-focused entrepreneurship in developing digital economies.

METHOD

This study adopted a quantitative explanatory research design to examine the structural relationships among foreign language education, digital literacy rooted in local wisdom, learning agility, and the sustainability of women-led MSMEs in the rural tourism context. The selection of this design was grounded in the study's objective of testing both direct and indirect effects, including mediation and moderation mechanisms, within a complex model. The conceptual framework was supported by the Theory of Planned Behavior (Ajzen, 2020) and Social Cognitive Theory (Bandura, 1986). For analytical rigor, we employed partial least squares structural equation Modeling (PLS-SEM) using SmartPLS 4.0, which is particularly appropriate for prediction-oriented analysis and for handling latent constructs in studies involving moderated mediation (F. Hair Jr et al., 2014; Hair et al., 2021).

This research was conducted in Samosir Regency, North Sumatra, Indonesia, a cultural tourism area where women-led MSMEs are growing in prominence. The population targeted in this study included female entrepreneurs in sectors such as culinary businesses, handicrafts, homestay services, and creative tourism. A purposive sampling strategy was employed to ensure that the respondents had relevant exposure to either digital platforms or foreign language training. A total of 320 responses were collected, of which 300 met the inclusion criteria and were retained for analysis. This sample size satisfied the minimum requirement for SEM-PLS as recommended by Hair et al. (2021), ensuring robust parameter estim.

The research instrument was a structured, self-administered questionnaire comprising closed-ended items, all measured using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The questionnaire items were adapted from previously validated instruments and

contextualized for local relevance and comprehension. Foreign language education items were adapted from Ge et al. (2023) and Santika et al. (2022), whereas digital literacy items were drawn from Purnama et al. (2021), Kasim (2024) and Zulkieflimansyah Zulkieflimansyah et al. (2024). Learning agility items were sourced from Das (2024) and Chang et al. (2023). Indicators of MSME sustainability, spanning innovation, resilience, and continuity, were adopted from Noerchoidah et al. (2025) and S. Mishra & Sahoo (2025). Demographic data, including business age, education level, and digital platform usage, were also collected to serve as control variables.

The analysis followed a two-step PLS-SEM approach. First, the reliability and validity of the measurement model are evaluated. Internal consistency was confirmed using composite reliability ($CR > 0.70$), while convergent validity was assessed using the Average Variance Extracted ($AVE > 0.50$). Discriminant validity was tested using both the Fornell–Larcker criterion and HTMT ratio (< 0.85). Model fit was deemed acceptable, with an SRMR < 0.08 and NFI > 0.90 (Henseler & Fassott, 2010). The structural model was tested to assess the significance of the path coefficients using bootstrapping with 5,000 resamples. This included evaluating direct, mediating, and moderating effects. The R^2 values were examined to determine the explained variance in the dependent construct, which indicated substantial explanatory power. The model also passed checks for multicollinearity ($VIF < 3.3$), and no anomalies were observed in the residual patterns.

RESULTS AND DISCUSSION

Respondent Characteristics

This study gathered data from 300 women entrepreneurs managing MSMEs in Samosir Regency's tourism sector. The sample exhibits diversity in terms of age, income, business experience, sectoral distribution, and training exposure. The age distribution indicated that the majority of participants were aged 26–35 years (36.7%), followed by 36–45 years (30.0%). The remaining were either above 45 (18.3%) or between 18 and 25 years (15.0%), highlighting broad intergenerational engagement in rural tourism entrepreneurship. In terms of monthly income, 38.3% earned IDR 1,000,000–2,500,000, 33.3% earned IDR 2,500,001–5,000,000, and 15.0% exceeded IDR 5,000,000. Only 13.3% reported earnings below IDR 1,000,000. The average income was approximately IDR 2,670,000, suggesting that most MSMEs operated at subsistence or moderate growth levels. Regarding business duration, 33.3% had operated for 4–7 years, 31.7% for 1–3 years, and 23.3% for over 7 years, while 11.7% had been in business for less than 1 year. These figures show that the majority were in the growth or consolidation stages. The business type was dominated by culinary enterprises (40.0%), followed by handicrafts (26.7%), homestay services (18.3%), and creative/tourism services (15.0%), reflecting Samosir's local economic orientation rooted in cultural resources. In terms of training exposure, 63.3% of the respondents had attended entrepreneurship training, while 36.7% did not. However, only 28.3% received foreign language training, revealing a substantial gap in linguistic preparedness, which is critical for cross-cultural communication and digital engagement in tourism-based enterprises.

These results, presented in Table 1, highlight a demographically and professionally heterogeneous respondent pool, reinforcing the relevance of this study in identifying targeted interventions to improve language and digital competencies among women-led MSMEs.

Table 1. Respondent Characteristics

Main Category	Characteristic	Frequency	Percentage (%)
Age Group	Age 18–25 years	45	15
	Age 26–35 years	110	36.7
	Age 36–45 years	90	30
	Age > 45 years	55	18.3
Monthly Income (IDR)	Income < IDR 1,000,000	40	13.3
	Income IDR 1,000,000–2,500,000	115	38.3
	Income IDR 2,500,001–5,000,000	100	33.3
	Income > IDR 5,000,000	45	15
Business Duration	Business duration < 1 year	35	11.7
	Business duration 1–3 years	95	31.7
	Business duration 4–7 years	100	33.3
	Business duration > 7 years	70	23.3
Type of Business	Culinary businesses	120	40
	Handicrafts	80	26.7
	Homestay services	55	18.3
	Creative/tourism services	45	15
Entrepreneurship Training	Attended entrepreneurship training	190	63.3
	Never attended entrepreneurship training	110	36.7
Foreign Language Training	Attended foreign language training	85	28.3
	Never attended foreign language training	215	71.7

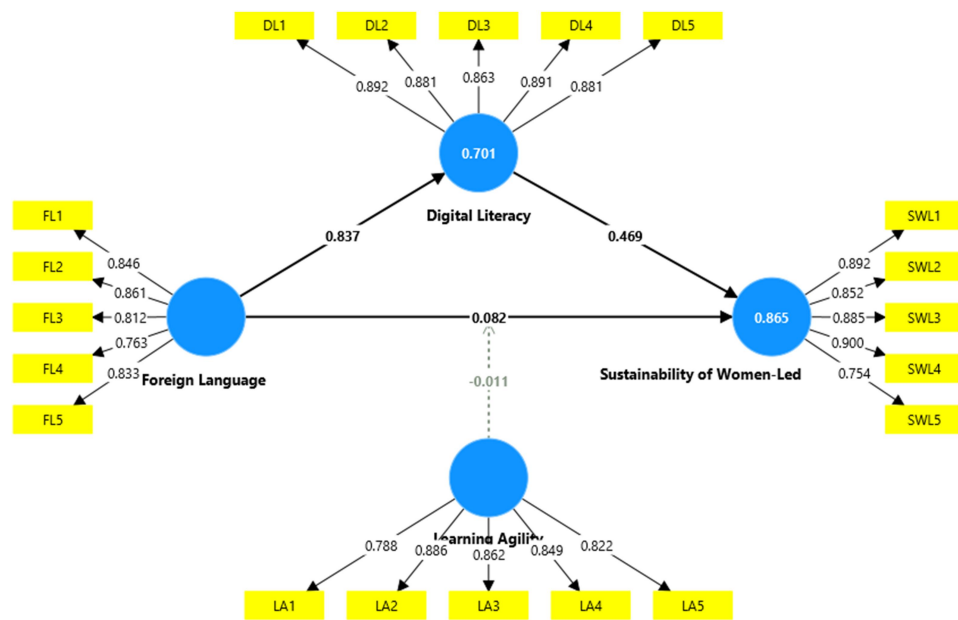
Outer Loading

Indicator reliability was evaluated using outer loading values for each observed item across five latent constructs: Digital Literacy, Foreign Language Proficiency, Learning Agility, Sustainability of Women-Led Enterprises, and the interaction construct. As shown in Table 2, all outer loadings exceeded the 0.70 benchmark, indicating satisfactory levels of indicator reliability and construct representation. Specifically, items measuring Digital Literacy (DL1–DL5) ranged from 0.863 to 0.892, whereas Foreign Language Proficiency (FL1–FL5) showed loadings between 0.763 and 0.861. The lowest loading (FL4 = 0.763) still satisfied the minimum reliability threshold. Learning Agility (LA1–LA5) items ranged from 0.788 to 0.886, and the sustainability construct (SWL1–SWL5) ranged from 0.754 to 0.900, confirming internal consistency within all scales. The interaction construct (Learning Agility $\times$ Foreign Language), built using the product-indicator approach, yielded a fixed loading of 1.000, as expected in the PLS-SEM interaction modeling.

These results affirm three key findings: (1) all constructs exhibit strong psychometric properties; (2) no indicators require removal or re-specification; and (3) the measurement model is theoretically sound and statistically valid, enabling further analysis of the mediation and moderation pathways in the structural model. Full loading values and construct alignments for transparency and replication are summarized in Table 2 and Fig. 1.

Table 2. Outer Loading

	Digital Literacy	Foreign Language	Learning Agility	Sustainability of Women-Led	Learning Agility x Foreign Language
DL1	0.892				
DL2	0.881				
DL3	0.863				
DL4	0.891				
DL5	0.881				
FL1		0.846			
FL2		0.861			
FL3		0.812			
FL4		0.763			
FL5		0.833			
LA1			0.788		
LA2			0.886		
LA3			0.862		
LA4			0.849		
LA5			0.822		
SWL1				0.892	
SWL2				0.852	
SWL3				0.885	
SWL4				0.900	
SWL5				0.754	
Learning Agility x Foreign Language					1.000



Construct Reliability and Validity

The results of the measurement model evaluation indicated that all the constructs demonstrated strong internal consistency and convergent validity, meeting the recommended psychometric thresholds. As shown in Table 3, Cronbach's alpha values ranged from 0.881 to 0.928, while Composite Reliability (ρ_c) scores exceeded 0.90 across constructs, indicating excellent internal consistency. Specifically, Digital Literacy ($\alpha = 0.928$, $\rho_c = 0.946$) and sustainability ($\alpha = 0.909$, $\rho_c = 0.933$) showed the highest reliability, followed by Learning Agility ($\alpha = 0.897$, $\rho_c = 0.924$), and Foreign Language Proficiency ($\alpha = 0.881$, $\rho_c = 0.913$). Furthermore, the Average Variance Extracted (AVE) values for all constructs exceeded the 0.50 threshold (Fornell & Larcker, 1981), indicating satisfactory convergent validity. The AVE scores ranged from 0.679 (Foreign Language) to 0.777 (Digital Literacy), confirming that each latent variable captured more than 67% of its item variance.

Table 3. Construct Reliability and Validity.

	Cronbach's alpha	Composite reliability (ρ_a)	Composite reliability (ρ_c)	Average variance extracted (AVE)
Digital Literacy	0.928	0.929	0.946	0.777
Foreign Language	0.881	0.884	0.913	0.679
Learning Agility	0.897	0.901	0.924	0.709
Sustainability of Women-Led	0.909	0.914	0.933	0.737

Model Fit Assessment

Model fit indices indicated that the structural model demonstrated acceptable empirical adequacy. As shown in Table 4, the Standardized Root Mean Square Residual (SRMR) value was 0.067 for the estimated model below the threshold of 0.08 confirming a good absolute fit (Henseler & Fassott, 2010). This suggests that the residual differences between the observed and predicted correlations were minimal. The discrepancy measures d_{ULS} (0.941) and d_G (0.665) remained within tolerable ranges and increased slightly compared with the saturated model, as expected when model constraints were imposed. This increase does not indicate misspecification, confirming the stability across configurations. The Chi-square statistic showed a modest increase, from 895.955 (saturated) to 935.276 (estimated). Given the sensitivity of this metric to sample size, its interpretation is descriptive; the values remain within the acceptable descriptive bounds for PLS-SEM.

Regarding Normed Fit Index (NFI), the estimated model produced a value of 0.839, which is close to the acceptable threshold of 0.85. Although slightly below the ideal value of 0.90, this still reflects a moderate-to-good comparative fit between the proposed and null models. The results of the measurement model evaluation indicate that all constructs demonstrated strong internal consistency and convergent validity, meeting recommended psychometric

Table 4. Model Fit

	Saturated model	Estimated model
SRMR	0.053	0.067
d_{ULS}	0.590	0.941
d_G	0.577	0.665
Chi-square	895.955	935.276
NFI	0.846	0.839

Path Coefficient Analysis

As shown in Table 5, the structural model testing produced five main findings corresponding to the research hypotheses.

First, Hypothesis 1 proposes a direct influence of foreign language proficiency on the sustainability of women-led MSMEs. However, the result was not statistically significant ($\beta = 0.082$, $t = 1.405$, $p = 0.080$), indicating that foreign language skills alone did not directly predict sustainability outcomes. This suggests that language competence may require additional enabling factors such as digital capacity to translate into business resilience.

Second, Hypothesis 2 tested whether foreign language proficiency positively influenced digital literacy. The results showed a strong and highly significant effect ($\beta = 0.837$, $t = 32.644$, $p < 0.001$), affirming that language ability facilitates access to digital tools, global platforms, and online knowledge. This finding supports the idea that foreign languages act as cognitive enablers in digital upskilling for women entrepreneurs.

Third, Hypothesis 3 examined the role of digital literacy as a mediator between foreign languages and sustainability. The total indirect effect was both statistically significant and substantial ($\beta = 0.393$, $t = 7.413$, $p < 0.001$), whereas the direct path remained non-significant. This provides robust support for full mediation, confirming that digital literacy is the mechanism by which language proficiency translates into sustainable business outcomes.

Fourth, Hypothesis 4 tested whether learning agility positively influences sustainability. The result was strong and significant ($\beta = 0.414$, $t = 6.000$, $p < 0.001$), indicating that adaptability, experimentation, and openness to learning are crucial for MSMEs in dynamic digital and tourism environments. This underscores the importance of psychological and behavioral flexibility in sustaining business performance.

Fifth, Hypothesis 5 explored the potential moderating effect of learning agility on the relationship between foreign languages and sustainability. The result was not statistically significant ($\beta = -0.011$, $t = 0.712$, $p = 0.238$), suggesting no interaction effect. In this context, learning agility and language proficiency appear to operate independently rather than interactively in influencing sustainability.

Table 5. Path Coefficient

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Foreign Language -> Sustainability of Women-Led	0.082	0.080	0.058	1.405	0.080
Foreign Language -> Digital Literacy	0.837	0.838	0.026	32.644	0.000
Digital Literacy -> Sustainability of Women-Led	0.469	0.462	0.061	7.680	0.000
Foreign Language -> Digital Literacy -> Sustainability of Women-Led	0.393	0.387	0.053	7.413	0.000
Learning Agility x Foreign Language -> Sustainability of Women-Led	-0.011	-0.009	0.016	0.712	0.238

Discussion

Foreign Language Proficiency and the Sustainability of Women-Led MSMEs

The structural model showed a non-significant direct relationship between foreign language proficiency and the sustainability of women-led MSMEs ($\beta = 0.082$, $T = 1.405$, $p = 0.080$). Although the coefficient is positive, the result suggests that language education alone is

insufficient to drive business sustainability. This unexpected outcome invites further conceptual reflection. In line with the Human Capital Theory (Becker et al., 2022), language acquisition is a productive investment. However, its value appears to be context-dependent, relying on integration with digital infrastructure, market-facing tools, and customer interaction systems. This finding reflects those of previous studies that emphasize the conditional nature of language effectiveness. For example, Riznar & Puntar (2023) and Torres et al. (2023) found that language skills support business resilience and cross-border engagement when paired with digital access or adaptive capacity.

Conversely, scholars such as Cardona (2023) and Onyeje et al. (2022) have criticized language training programs in rural contexts for lacking practical applications. Tomé et al. (2022) and Fauzia & Hidayati (2023) further argue that systemic barriers such as limited time, domestic burdens, and poor infrastructure restrict women's ability to translate language skills into economic gains.

Collectively, these findings indicate that foreign language proficiency functions more as an enabler than as a direct predictor of sustainability. Its influence is likely indirect and mediated through digital literacy, market linkages, and learning agility. As such, the absence of a direct effect should not be viewed as ineffectiveness but rather as evidence of the need for integrated capacity building.

This study contributes by affirming that language skills require activation via digital platforms, applied contexts, and flexible learning to influence business outcomes. Language remains underutilized, unlinked to broader competencies. In essence, the impact of foreign language proficiency is amplified when it is embedded within entrepreneurial ecosystems, including digital capability and adaptability. As a standalone skill, its effect is limited, and when combined, it becomes catalytic. Training programmes should adopt interdisciplinary approaches that integrate language, technology, and gender-sensitive delivery. Future studies should explore moderated mediation to clarify how language education supports sustainable entrepreneurship under various conditions.

Foreign Language Proficiency and Digital Literacy

Structural model analysis confirmed a strong and statistically significant effect of foreign language proficiency on digital literacy among women-led MSMEs ($\beta = 0.837$, $T = 32.644$, $p < 0.001$). This suggests that female entrepreneurs with stronger language skills are substantially more capable of navigating digital tools, especially those related to global content, multilingual platforms, and cross-border e-commerce. This result aligns with Human Capital Theory (Becker et al., 2022), which posits that education and skill acquisition enhance productive capacity. Language competence contributes to cognitive capital, whereas digital literacy operationalizes capital into entrepreneurial action (Riznar & Puntar, 2023; Tomé et al., 2022). This relationship is further supported by Social Cognitive Theory (Bandura, 1986), which emphasizes the role of self-efficacy in transforming skills into behavior. As women gain confidence in using digital tools in multiple languages, their readiness to innovate and participate in digital markets increases (Ge et al., 2023; Zulkieflimansyah Zulkieflimansyah et al., 2024).

Theoretically, this demonstrates that digital and linguistic capital mutually reinforce each other. Digital literacy is not an isolated construct, but is often enabled and amplified by language skills, particularly in tourism-based MSMEs that rely heavily on international communication (PRASANTY & NURLINA, 2024). Empirical studies have echoed this dynamic. Santika et al. (2022) found that embedding English into local tourism improved both service delivery and digital engagement. Similarly, Luthfia et al. (2025) reported higher digital training success when

participants had basic language comprehension skills. However, as Cardona (2023) and Shaikh & Zakaria (2022) warn, language instruction that lacks digital integration often fails to produce real-world entrepreneurial outcomes. Thus, while foreign language skills enhance access to information and global networks, their value is fully realized only when integrated with digital applications. This study demonstrates that language proficiency acts as a strategic enabler of digital capacity, especially for women entrepreneurs in emerging markets.

Digital Literacy and the Sustainability of Women-Led MSMEs

The structural model showed a strong and significant relationship between digital literacy and the sustainability of women-led MSMEs ($\beta = 0.469$, $T = 7.680$, $p < 0.001$). This indicates that female entrepreneurs with higher digital competence are more likely to sustain, adapt, and grow their ventures, particularly in platform-driven and tourism-based economies. This finding is grounded in the Theory (Ajzen, 2020), in which perceived behavioral control plays a central role. Digital literacy enhances women's confidence in managing online systems, engaging in digital commerce, and automating business processes, thereby increasing their belief in entrepreneurial capacity. This aligns with Social Cognitive Theory (Bandura, 1986), which views self-efficacy as a key bridge between skill mastery and behavior. The ability to develop digital content, manage e-payments, and conduct online sales reinforces women's sense of control, encouraging persistence, innovation, and proactive decision making (Živković et al., 2024). From the lens of Human Capital Theory (Becker et al., 2022), digital literacy represents a strategic form of skill investment that enables greater market access and operational agility. This study validates this position, highlighting digital skills not merely as technical tools but as assets for business resilience and growth.

Empirical studies have supported these claims. Parlyna & Girsang (2024) reported improved efficiency and resilience through adoption of digital tools. Sufa et al. (2024) and Arissaputra & Sentika (2023) find that women trained in digital marketing become more responsive and confident—especially in sectors requiring cultural branding and narrative engagement. Recent research suggests that digital content anchored by local wisdom has a stronger market impact. Kasim (2024) found that indigenous storytelling enhances emotional connection and brand authenticity, while Zulkieflimansyah Zulkieflimansyah et al. (2024) showed that heritage-based content improves MSME visibility and loyalty in the tourism sector.

However, these barriers still persist. Poor infrastructure, digital distrust, and gendered time-poverty limit impacts. Luthfia et al. (2025) and Muhammad et al. (2024) note that many training programs are urban-biased and fail to address rural realities. Without culturally rooted, inclusive, and community-based digital interventions, these programmes risk perpetuating exclusion. In summary, digital literacy is a critical enabler of sustainability, but its success depends on context-sensitive design, structural support, and cultural integration.

The Mediating Role of Digital Literacy and the Effect of Learning Agility

The structural model confirms the strong and significant positive effect of learning agility on the sustainability of women-led MSMEs ($\beta = 0.414$, $T = 6.000$, $p < 0.001$). This underscores that women entrepreneurs who demonstrate greater adaptability, experimentation, and openness to learning are more capable of sustaining business operations, especially in volatile contexts, such as digital commerce and rural tourism. These findings support the argument that psychological and behavioral flexibility, as core features of learning agility, enable women to respond effectively to dynamic market shifts, integrate digital tools, and continuously refine their strategies. In disrupted digital ecosystems, these traits help women entrepreneurs navigate

uncertainty, shift consumer behaviors, and adopt innovations, such as e-commerce platforms and mobile payments, which are key enablers for survival and growth.

This relationship was reinforced by the mediating role of digital literacy. Prior studies (Noerchoidah et al., 2025; Zulkieflimansyah Zulkieflimansyah et al., 2024) indicate that learning agility alone does not guarantee transformation, unless paired with digital competence. Women who are eager to learn but are digitally excluded often face barriers to implementation. By contrast, those with both capacities are more likely to leverage language proficiency and global market access (Jiang, 2025; S. Mishra & Sahoo, 2025).

From a theoretical perspective, this interplay aligns with Social Cognitive Theory (Bandura, 1986), which emphasizes that self-efficacy arises not merely from knowledge but also from confidence in acting upon that knowledge. Learning-agile women with digital skills display stronger entrepreneurial self-efficacy, which drives persistence, innovation, and sustainable decision making. In conclusion, these findings highlight that enhancing sustainability in women-led MSMEs requires more than skill-building, which requires fostering a mindset that is adaptable, digital, and forward-looking. When activated through digital literacy, learning agility becomes a strategic capability that supports long-term enterprise viability.

The Moderating Role of Learning Agility

The structural model indicates that learning agility does not significantly moderate the relationship between foreign language proficiency and sustainability among women-led MSMEs ($\beta = 0.011$, $T = 0.712$, $p = 0.238$). While both constructs showed positive individual effects, the absence of interaction suggests that they operate independently rather than synergistically in this model. This finding diverges from the predictions of the Resource-Based View (RBV) (Barney & Hesterly, 2019), which posits that dynamic capabilities such as learning agility help transform knowledge-based resources into sustained competitive advantage. It was expected that learning agility would enhance the application of language skills in business contexts through adaptive behaviors (Chang et al., 2023; Das, 2024).

However, these non-significant results may reflect contextual constraints. In many rural and tourism-based MSMEs, foreign language use is limited to narrow functions, such as customer greetings or labeling, thus reducing the scope for strategic adaptation. Moreover, learning agility may exert a greater influence in domains where digital literacy, rather than language, is the key to operational performance. This aligns with evidence from Riawan et al. (2023) and D. Mishra et al. (2024), who find that agile entrepreneurs tend to leverage technology tools more effectively than linguistic capital.

Another possibility is that the moderating effect is mediated by latent variables, such as platform access, entrepreneurial orientation, or self-efficacy, which were not explicitly modeled. As Sura et al. (2024) and Luthfia et al. (2025) suggested, adaptive capacity alone is insufficient without structural and digital ecosystems that support applied learning and behavioral execution. In conclusion, although foreign language proficiency and learning agility independently supported sustainability, their interactions were not evident in this study. This suggests the need for future research to explore conditional models, such as moderated mediation or multigroup analysis, to better understand how entrepreneurial competencies function in tandem under varying environmental and digital conditions. The results and discussion should be presented in the same part, clearly and briefly. The discussion part should contain the benefit of the research result, not the repeat result part. The results and discussion part can be written in the same part to avoid the extensive quotation. Tables or graphs must present different results. The results of data analysis must be reliable in answering research problems. References to the discussion should

not repeat the references in the introduction. Comparisons to the findings of previous studies must be included.

CONCLUSION

This study examines how foreign language proficiency, digital literacy, and learning agility influence the sustainability of women-led MSMEs in rural tourism economies. Using a PLS-SEM approach and drawing on the Theory of Planned Behavior, Social Cognitive Theory, and Human Capital Theory, this study offers five key findings.

First, foreign language proficiency does not directly affect sustainability but shows a significant indirect effect through digital literacy, confirming its role as an enabling factor rather than a standalone driver of business resilience.

Second, there is a strong positive relationship between language proficiency and digital literacy, suggesting that linguistic competence enhances digital capability, especially in navigating global content and e-marketplaces.

Third, digital literacy exerts a direct and substantial influence on MSME's sustainability. Its impact is especially potent when it is rooted in local cultural knowledge, supporting innovation, brand trust, and long-term market engagement.

Fourth, learning agility positively contributes to sustainability, validating its role as a behavioral resource for adaptation and growth in volatile environments. However, it did not moderate the link between language skills and sustainability, indicating that these variables function independently rather than interactively.

These findings add to the growing body of knowledge on gendered entrepreneurship by identifying digital literacy as a mediating mechanism, and learning agility as an independent catalyst for MSME sustainability. This study confirms previous theoretical claims and advances the literature by integrating cognitive, technological, and linguistic dimensions in a rural tourism context.

Practically, the results imply that training programs must move beyond isolated languages or digital modules. Instead, they should deliver integrated, culturally grounded, and gender-responsive interventions to foster adaptive digital entrepreneurship among women.

Limitations include the study's geographic concentration in Samosir, which may limit the generalizability of the findings. Moreover, potential moderators, such as platform access, institutional support, or an entrepreneurial mindset, were not modeled.

Future research should consider multi-regional or longitudinal studies, explore serial mediation, or apply multi-group SEM to better capture the dynamics across diverse sociocultural and technological environments.

ACKNOWLEDGMENTS: The authors express their sincere gratitude to the Ministry of Education, Science, and Technology for the 2025 PDP Fund Grant under Contract 001/E.1/PBI/MS/10/LL/VI/2025. All women-led MSME participants in Samosir Regency who generously contributed as respondents and research partners. Appreciation is also expressed to the academic and administrative teams of the Indonesian Business Polytechnic for their technical support during the data collection process.

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