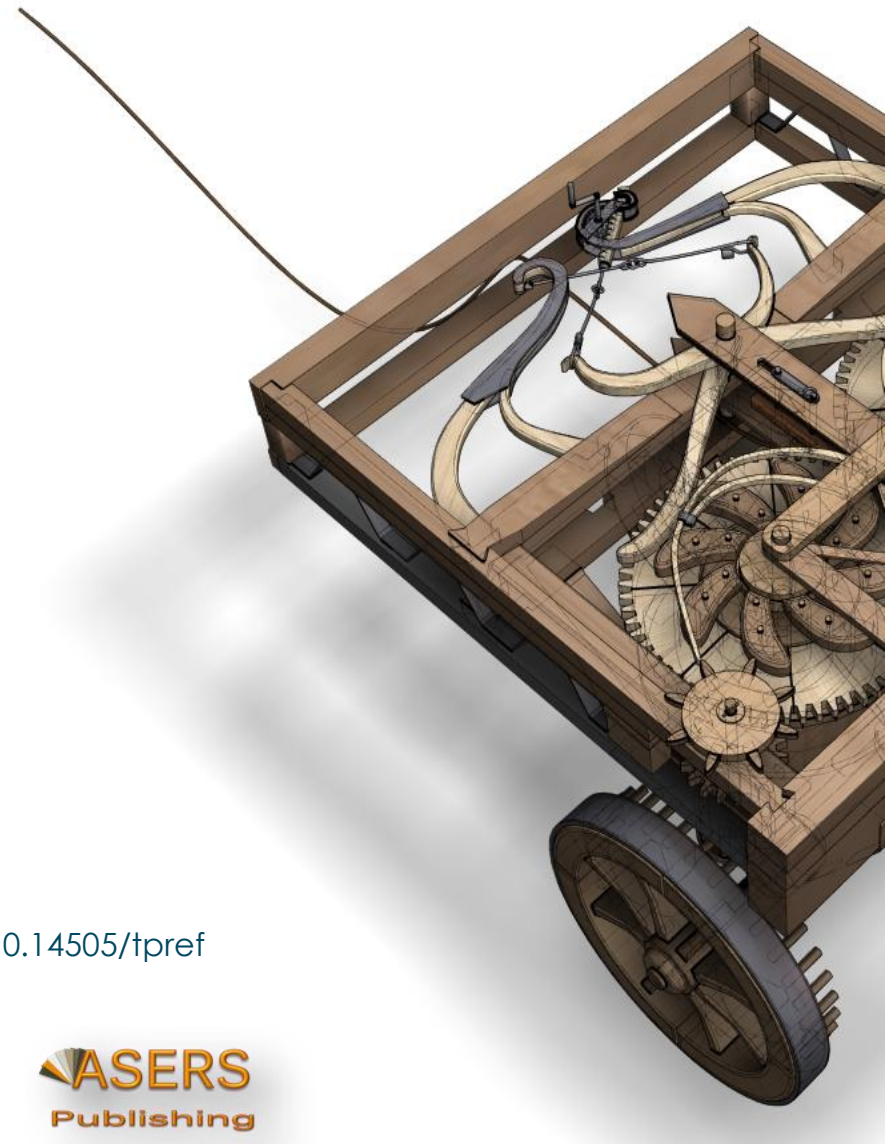
Theoretical and Practical Research in Economic Fields



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Theoretical and Practical Research in Economic Fields

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Drivers of the Smart Green Economy in Rural Settings: An Empirical Study on Local Wisdom, ICT, and the Mediating Role of Entrepreneurship

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Abstract: This study provides local governments with critical insights into the role of Micro, Small, and Medium Enterprises (MSMEs) in advancing smart green economies within smart villages, particularly through the lenses of local wisdom, Information and Communication Technology (ICT), and entrepreneurship. Drawing on a sample of 142 MSME participants, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the relationships among key variables. Findings reveal that the interplay between local economic practices, ICT adoption, and entrepreneurial capacity significantly influences the development of a smart green economy. Notably, integrating indigenous knowledge with digital technologies emerges as a pivotal driver of economic transformation. Local wisdom and knowledge shape products and services' unique character and cultural value, helping communities stand out and grow their economies. When people in these communities use digital tools, especially the internet, in their businesses, it opens up new opportunities and encourages innovation. Still, having strong entrepreneurial skills is key. They do not directly drive the economy, but they help connect traditional wisdom and modern technology in ways that make growth possible. It demonstrates the importance of blending traditional heritage with innovation to create a thriving, sustainable future for rural areas.

Keywords: smart green economy; MSMEs; local wisdom; ICT; entrepreneurship mediation.

JEL Classification: O33; L26; L86; R58; D83.

Introduction

The rapid growth of internet access is transforming rural communities across Indonesia, paving the way for digital and smart village initiatives, reshaping local economies and lifestyles. These efforts align with the United Nations' Sustainable Development Goal 9, emphasizing the need for infrastructure and innovation tailored to local contexts (Iskandar, 2020). Indonesia's rich cultural diversity and natural resources make it an ideal setting for integrating indigenous knowledge into modern development strategies. Increasingly, the country's economic progress is linked to preserving and using local wisdom (Indrawan, 2018). A landmark moment came in 2017:

Lamahu Village in Gorontalo launched a digital command center using Android technology. This pioneering step laid the foundation for smart village programs, including four pilot villages in Yogyakarta between 2017 and 2018.

One standout initiative was the smart green economy program in Kulon Progo Regency (Santoso et al., 2019). Indonesia's rising Information and Communication Technology (ICT) Development Index has played a crucial role in supporting these innovations. As interest in smart village research grows, so does the number of digital village projects and startups.

Early studies have focused on building conceptual models (Ella & Andari, 2018). In Bogor Regency, the local government prioritized sports and tourism development from 2018 to 2023, as outlined in the 2019 Development Planning Deliberation. In response to economic recovery needs, authorities have also focused on strengthening small and medium-sized enterprises (SMEs) through training, financial support, and digital innovation, especially via e-commerce platforms (Nugroho Himawan et al., 2024). SMEs are vital to Indonesia's economy, driving growth in both urban and rural areas (Herlinawati & Machmud, 2020). In Bogor Regency, village-level economic recovery is a strategic priority. One promising approach involves integrating micro-enterprises with tourism under a smart village framework. These villages thrive on active community participation, blending technology with creativity. Success depends on digital literacy and collaboration among government bodies, private companies, universities, and media outlets. Crucially, local wisdom remains at the heart of these efforts, supporting sustainable economic practices (Sukawati, 2017), environmental stewardship (Vitasurya, 2016), and the preservation of cultural heritage (Rudwiarti et al., 2021).

Entrepreneurs in these settings need a broad skill set, from production and finance to marketing and strategic planning (Aryani, 2019; Onojaefe & Leaning, 2007). This study uses the Regional Innovation System (RIS) framework to explore how regional policies and market-driven capabilities can foster innovation and competitiveness (Samara et al., 2023). Effective decision-making in this context requires adapting technologies and business strategies to fit local conditions (Carayannis et al., 2022). This study aims to fill a gap in understanding how digital tools, especially ICT, interact with entrepreneurship and local wisdom to build smart green economies. Using Structural Equation Modeling (SEM), the study provides a practical framework for regional policy and strategic planning, enabling the identification of strengths and areas for improvement. Ultimately, this study provides a comprehensive look at how entrepreneurship, ICT, and local products contribute to village-level economic growth. It emphasizes the importance of flexible, forward-thinking strategies in supporting sustainable rural development. The findings will be relevant to researchers, policymakers, business owners, and community members. Focusing on the Kemang sub-district in Bogor Regency, the study highlights the importance of integrating local wisdom with digital innovation to empower micro, small, and medium-sized enterprises in developing smart village economies.

1. Literature Review

1.1. A Theory of Local Entrepreneurship

The development of small businesses is deeply influenced by the local environment in which they operate. This "milieu" shapes the opportunities available and how entrepreneurs connect with their communities. One of the key ingredients in this process is social capital. The relationships and trust that allow entrepreneurs to build, grow, and sustain their ventures. Whether formal (e.g., business associations) or informal (e.g., community ties), entrepreneurial networks act as vital channels for sharing knowledge, resources, and experiences. However, these networks are only as strong as the businesses within them. When entrepreneurs actively participate, innovate, and contribute, they help the network evolve, creating a feedback loop where the business and the network grow together. This idea is captured in the "reversed arrow" concept: businesses do not just benefit from the network; they also shape it. However, the arrival of large commercial players, such as national retail chains or department stores, can disrupt this dynamic. While these entities may bring jobs and consumer options, they often pose a threat to smaller, locally rooted businesses. The impact is especially visible in urban areas, where small shops along major streets may be forced to close, leading to job losses and weakening local entrepreneurial fabric.

Understanding the overall effect of these changes is complex. On one hand, consumers enjoy more choices and potentially lower prices. On the other hand, the unique value of local businesses is often more attuned to community needs but is diminished. Consumer preferences play a big role here. Many people favor well-known national or global brands, influenced by broad marketing campaigns and standardized offerings that overlook local nuances. It may be due to a lack of awareness about the quality and diversity of local products or the perception that local businesses cannot compete. In contrast, when local entrepreneurs collaborate in drawing on shared cultural and economic values. They can reinforce regional economies and spark growth. Their success

depends on their ability to innovate and respond quickly to changing market demands. As Julien (2007) notes, the future of local business competitiveness lies in adaptability and creativity.

1.2. Open Innovation in SMEs

The National Innovation System (NIS) has been the go-to framework for understanding how innovation happens within countries. However, as globalization continues to blur cultural and strategic boundaries, there is growing interest in Regional Innovation Systems (RIS). These offer a more localized lens, focusing on how specific regions foster innovation and economic growth by tapping into their unique contexts and strengths (Samara et al., 2023). Open Innovation (OI) has emerged as a powerful strategy in this landscape. Rather than keeping innovation efforts strictly in-house, OI encourages companies to collaborate with external partners in sharing ideas, technologies, and resources to boost their creative capacity (Bigliardi et al., 2021). This approach is especially valuable for small and medium-sized enterprises (SMEs). These businesses often operate with limited resources, making it harder to innovate independently. By engaging in open innovation, SMEs can tap into broader networks, learn from others, and bring in fresh perspectives that help them grow and stay competitive (Herlinawati & Machmud, 2020; Prima Lita et al., 2020; Tosida et al., 2022). As Prasanna et al. (2019) point out, adopting open innovation is not just a nice-to-have; it is essential for survival in today's fast-moving global market. SMEs that embrace this model tend to be more open to risk, more focused on customer needs, and better at adapting their business models. They also understand the importance of working with their communities and building strong partnerships, recognizing that innovation thrives in collaboration.

1.3. Information and Communication Technology, Local Wisdom, and Entrepreneurship

Information and Communication Technology (ICT) plays a transformative role in rural economies, as a bridge connecting local businesses to broader national and global markets (Maja et al., 2020). By improving communication, lowering transaction costs, and providing access to market insights, ICT helps entrepreneurs start, grow, and scale their ventures (M Del Giudice & Straub, 2011; Tosida et al., 2022). Entrepreneurs benefit from ICT in several meaningful ways:

- Boosted Motivation and Awareness: Digital interactions among entrepreneurs foster a sense of community and influence, increasing awareness of available tools and their potential. It leads to quicker responses to market changes and more agile business strategies (Chen et al., 2015; Hartanto et al., 2021; Jayawinangun et al., 2024).
- Better Communication and Coordination: ICT makes sharing information and coordinating with suppliers, customers, and partners easier. It reduces uncertainty and improves the chances of business success.
- Smarter Decision-Making: With access to digital tools, entrepreneurs can gather and analyze data more effectively, helping them make informed decisions and innovate with confidence (M Del Giudice & Straub, 2011).

In this study, ICT is viewed through its practical use in small and medium-sized enterprises (SMEs), including computers, internet access, websites, and online platforms for marketing and sales. These technologies are seen as key drivers of entrepreneurial activity. While mobile phones and internet access are becoming more common, challenges remain. Infrastructure gaps and differences in digital literacy still affect how evenly ICT benefits are distributed across regions and local communities. The cultural values and traditions embedded in communities continue to shape entrepreneurs' businesses. These values influence behaviour, promote sustainable practices, and strengthen the social fabric of local economies (Aryani, 2019). By combining the power of ICT with the richness of local wisdom, rural areas can foster more inclusive and sustainable entrepreneurship. This synergy offers a promising path forward for communities seeking to thrive in a digital age without losing their cultural identity.

1.4. Smart Green Economy

The economic dimension plays a vital role in shaping and sustaining smart villages. One of the most promising approaches to rural development is the creative economy, especially when it is rooted in local wisdom. This kind of economy not only boosts income and creates jobs but also improves rural communities' overall quality of life (Faridha, 2022; Widyanti et al., 2022). In Indonesia, for example, innovations inspired by local traditions have helped small and medium-sized enterprises (SMEs) improve their marketing performance (Indrawan, 2018). Entrepreneurs in rural areas often draw on their cultural heritage, traditional knowledge, and local resources to create unique products that stand out in the market (Muchson et al., 2023). A great example is

agro-tourism, which blends agriculture with tourism and has positively impacted social, economic, and environmental dimensions (Widyanti et al., 2022). Using local wisdom strategically, especially in tourism branding, can bring broader economic benefits, such as increased GDP, expanded international trade, and more foreign investment (Utomo et al., 2023). The success of smart village initiatives depends heavily on each village's unique resources and potential. That is why there is no one-size-fits-all model; each smart village must be shaped by its political, economic, social, and cultural context (Zavratnik et al., 2018).

As Davidenko et al. (2018) highlight, economic growth in smart villages is marked by diversity in different types of businesses, strong human capital, and well-managed budgets. The smart green economy is one of the core pillars of the smart village concept, alongside smart mobility, smart environment, smart people, smart living, and smart tourism (Santoso et al., 2019). This framework is innovation and entrepreneurship, which drive economic transformation. This study builds on existing literature to define and measure three key variables: (i) Local wisdom (Juliana Jaya et al., 2020; Sukawati, 2017), (ii) Information and Communication Technology (ICT) (Meirelles, 2020; Singh et al., 2018; STATEC, 2013), (iii) Entrepreneurial ability (Aryani, 2019; Onojaefe & Leaning, 2007). These variables are operationalized using composite indicators, which are detailed in Table 1 of the study.

Table 1. Hierarchical component of the studied constructs or variables

First-order	Number of Indicators	High-order
Uniqueness	3	Local Wisdom
Communication Bridge	3	
Local culture concept	2	
Balance with the environment & religious values	3	
Infrastructure & Technology	21	Smart green economy
Social	13	
Economy	12	

On the basis of the theoretical framework and insights derived from the literature review, the following hypotheses are proposed to guide the empirical investigation:

Hypothesis 1 (H1): Information and Communication Technology (ICT) positively affects entrepreneurship.

Hypothesis 2 (H2): Local wisdom positively contributes to entrepreneurial development.

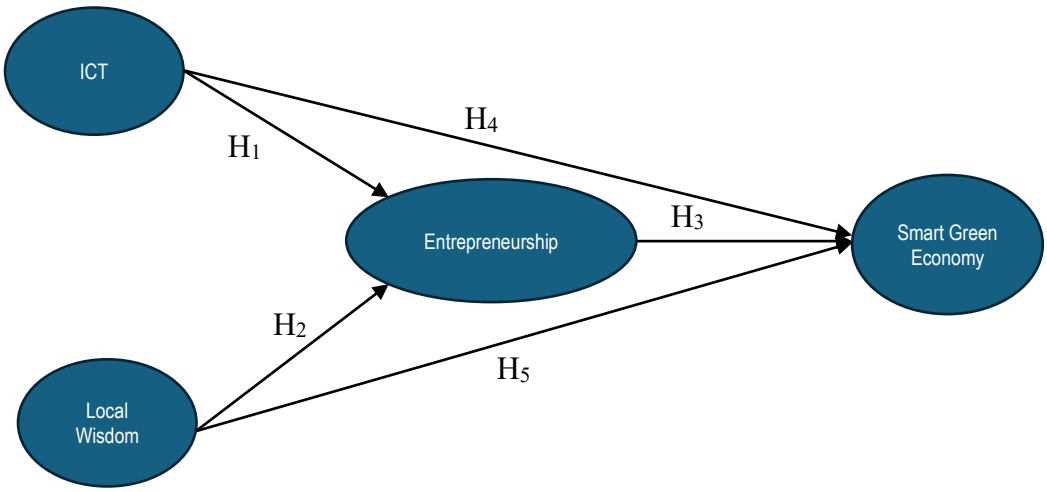
Hypothesis 3 (H3): Entrepreneurship positively affects the development of a smart green economy.

Hypothesis 4 (H4): ICT positively affects the advancement of a smart green economy.

Hypothesis 5 (H5): Local wisdom positively impacts the smart green economy.

These hypotheses collectively form the basis for the structural model illustrated in Figure 1, which conceptualizes the interrelationships among ICT, local wisdom, entrepreneurship, and the smart green economy.

Figure 1. Research Framework



2. Materials and Methods

2.1. Study Location and Participants

This study was conducted in Kemang District, located in Bogor Regency, Indonesia. The selection of Kemang District, particularly Tegal Village, was based on its notable strengths in gender-based micro-enterprises and local wisdom. In 2020, Tegal Village was awarded second place in the Program to Increase the Role of Women towards Healthy and Prosperous Families (P2WKSS) in West Java Province, recognizing its achievements in promoting micro-enterprises and initiatives grounded in gender sensitivity and local cultural values (Andria et al., 2022). A total of 142 respondents participated in the survey. The sampling process employed non-probability techniques, specifically convenience and snowball sampling, to recruit participants. These methods were deemed appropriate given the study's exploratory nature and the research's localized context.

Table 2. Result of Demography Profile of Respondents (n = 142)

Characteristic	Category	Frequency	Percentage
Gender	Male	47	33.1
	Female	95	66.9
Age	20 – 29 years old	31	21.8
	30 – 39 years old	48	33.8
	40 – 49 years old	30	21.1
	50 – 59 years old	26	18.3
	60 years old and above	7	4.9
Education	Elementary school	60	42.3
	Junior high school	35	24.6
	Senior high school	40	28.2
	Bachelor and postgraduate	7	4.9
Type of business	Food & Beverages	79	55.6
	Fruit & Vegetables	17	12
	Grocery	16	11.3
	Service	9	6.3
	Fashion	4	2.8
	Fisheries	4	2.8
	Handicraft	4	2.8
	Beauty	3	2.1
	Other	6	4.2

Table 2 presents the demographic characteristics of the study participants. The sample comprised 66.9% female and 33.1% male respondents. Participants' ages ranged from 20 to 85 years, with a mean age of 40.12 years and a standard deviation of 12.17. For analytical purposes, participants were categorized into age groups: 20–29, 30–39, 40–49, 50–59, 55–64, and 65–69. The 30–39 age group represented the largest proportion of respondents, accounting for 33.8% of the sample. In terms of educational background, most participants had attained primary school education. Regarding business type, the sample was predominantly engaged in food and beverage enterprises, indicating a concentration of entrepreneurial activity within this sector.

Drawing on a sample of 142 MSME participants, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the relationships among key variables. Findings reveal that the interplay between local economic practices, ICT adoption, and entrepreneurial capacity significantly influences the development of a smart green economy.

3. Results

3.1. Evaluation of Measurement Model

3.1.1. Construct Validity and Reliability

The repeated indicator approach aims to build the higher-order constructs in this study. This method involves creating a second-order latent variable that includes all the indicators from its related first-order constructs

(Sarstedt et al., 2019). In simpler terms, it means combining several related dimensions into a broader concept. Two key constructs, local wisdom and smart green economy, were treated as second-order constructs: (1) Local wisdom was broken down into four dimensions: (i) Uniqueness, (ii) Local culture, (iii) Regional communication, (iv) Harmony with environmental and religious values. Smart green economy included three dimensions: (i) Social, (ii) Economic, and (iii) infrastructure & technology. To represent these constructs, all the indicators from the first-order dimensions were reused at the second-order level. For example, each indicator served two roles: (i) as a measure for its specific dimension and (ii) as a contributor to the broader second-order construct. This dual role helped shape the outer model, which defines how indicators relate to their constructs. Meanwhile, the inner model included path coefficients, essentially weights that link the first-order constructs to the second-order ones. To ensure the reliability of each indicator, the study checked how strongly each one loaded onto its respective construct.

A loading value of 0.60 or higher was considered acceptable for exploratory research (Hair et al., 2019). Indicators that did not meet this threshold were removed individually, with the model recalculated each time. For instance, the “unique 3” indicator from the uniqueness dimension was excluded because it did not meet the reliability criteria. The results of the following validity and reliability assessments: Internal Consistency Reliability: Measured using Composite Reliability (CR) coefficients, most constructs demonstrated CR values above the recommended threshold of 0.70, except for the uniqueness dimension. Convergent Validity: Evaluated through the Average Variance Extracted (AVE), most constructs achieved AVE values above 0.50, except for the local wisdom construct. Discriminant Validity: Assessed using the Fornell-Larcker criterion, which was satisfactory for all multi-item constructs except for Frequency of Social Media Use. In this case, the square root of AVE (0.71) was lower than its correlation to the Intention to Use Social Media construct (0.75). Despite this exception, the cross-loadings matrix (see Table 3) revealed that indicators loaded more strongly on their respective constructs than on others, thereby providing additional support for the discriminant validity of the final measurement model.

Table 3. Result of Construct Validity, Reliability, and Convergence Validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Balance with the environment and religious values	0.845	0.864	0.905	0.761
Communication bridge	0.836	0.836	0.901	0.753
Economy	0.970	0.970	0.973	0.752
Entrepreneurship	0.744	0.745	0.837	0.562
ICT	0.905	0.907	0.925	0.639
Infrastructure & Technology	0.985	0.986	0.986	0.775
Local Wisdom	0.858	0.883	0.886	0.451
Local culture concept	0.801	0.816	0.909	0.833
Smart green economy	0.988	0.988	0.988	0.649
Social	0.970	0.971	0.973	0.738
Uniqueness	0.625	0.630	0.842	0.727

Table 3 presents the results of this study's validity and reliability assessments. Internal consistency reliability was evaluated using Composite Reliability (CR) coefficients, with most constructs demonstrating CR values above the recommended threshold of 0.70, except for the uniqueness dimension. Convergent validity was assessed through the Average Variance Extracted (AVE), where most constructs achieved AVE values exceeding 0.50, although the local wisdom construct fell below this benchmark. Discriminant validity was examined using the Fornell-Larcker criterion, which was satisfactory for all multi-item constructs except for the Frequency of Social Media Use. In this case, the square root of its AVE (0.71) was lower than its correlation to the Use Social Media construct (0.75), indicating a potential issue. Nevertheless, the cross-loadings matrix, also shown in Table 3, demonstrated that all indicators loaded more strongly on their intended constructs than on others, providing additional evidence supporting the discriminant validity of the final measurement model.

3.2. Evaluation of Structural Model

The structural model was assessed through path coefficients and their statistical significance, as presented in Table 4. These estimates were derived using 5,000 bootstrap resampling iterations to ensure robustness and reliability. A key metric in evaluating the structural model is the coefficient of determination (R^2), which reflects the

model's predictive power. This study used R^2 (R-squared) to measure how well the predictor variables explain the variance in a particular outcome, or endogenous construct. Simply put, R^2 tells us how much change in one variable can be explained by changes in others. The values range from 0 to 1, with higher numbers indicating stronger explanatory power. According to Chin's guidelines (Hair et al., 2019): (i) An R^2 of 0.67 or higher is considered substantial, (ii) Around 0.33 is moderate, (iii) Near 0.19 is weak In this study's path analysis, one key finding stood out: entrepreneurship did not significantly influence the smart green economy construct. It might seem surprising initially, but it makes more sense when we look at the sample. Most business actors involved were small-scale enterprises, many earning below the regional minimum wage. Because of their limited economic output, their overall contribution to the regional economy and, by extension, to the smart green economy framework was relatively minor. It suggests that while entrepreneurship is important, its impact on broader economic transformation may depend heavily on the scale and capacity of the businesses involved.

Table 4. Results of Coefficient Determination, Multicollinearity, and Hypothesis Testing

	Path Analysis	Beta	t -stat	Sig.	R^2	VIF	Decision
H1	ICT -> Entrepreneurship	0.569**	11.191	0.000	0.324	1.479	Supported
H2	Local wisdom -> Entrepreneurship	-0.002	0.027	0.979		1.034	Not Support
H3	Entrepreneurship -> Smart green economy	-0.050	0.545	0.000	0.275	1.514	Not Support
H4	ICT -> Smart green economy	0.361**	4.717	0.586		1.034	Not Support
H5	Local wisdom -> Smart green economy	0.347	5.229	0.000		1.034	Supported

Table 4 presents the results of hypothesis testing using structural equation modelling, examining the relationships among ICT, local wisdom, entrepreneurship, and the smart green economy. Hypothesis H1, which posits that ICT influences entrepreneurship, is supported with a strong and significant path coefficient ($\beta = 0.569$, $t = 11.191$, $p < 0.001$). It suggests that ICT plays a vital role in fostering entrepreneurial activity, explaining 32.4% of the variance in entrepreneurship ($R^2 = 0.324$). The variance of inflation factor (VIF) of 1.479 indicates no multicollinearity issues. In contrast, H2, which examines the influence of local wisdom on entrepreneurship, is not supported. The path coefficient is almost negligible ($\beta = -0.002$), with a t-value of 0.027 and an insignificant p-value of 0.979, indicating that local wisdom does not contribute meaningfully to entrepreneurial development in this context.

Similarly, H3, which assesses the effect of entrepreneurship on the smart green economy, is also not supported. Despite a coefficient of $\beta = -0.050$ and a t-value of 0.545, the reported p-value is 0.000, which appears to be a reporting error. Given the low t-value, the relationship is statistically insignificant, suggesting that entrepreneurship does not significantly drive the development of a smart green economy in this model. Nevertheless, the model explains 27.5% of the variance in the smart green economy ($R^2 = 0.275$), with a VIF of 1.514. H4 explores the direct impact of ICT on the smart green economy. Although the path coefficient is moderately strong ($\beta = 0.361$) and the t-value is 4.717, suggesting significance, the reported p-value of 0.586 contradicts this and leads to the hypothesis being rejected. This inconsistency indicates a potential reporting error and warrants further clarification. Lastly, H5, which tests the relationship between local wisdom and the smart green economy, is supported. The results show a significant and positive effect ($\beta = 0.347$, $t = 5.229$, $p < 0.001$), suggesting that incorporating local cultural values contributes positively to building a smart green economy. All VIF values across the model are below 5, indicating that multicollinearity is not a concern.

Table 5. Result of Effect Size (f-square)

Path	f^2	Sig.
ICT -> Entrepreneurship	0.464	0.000
Local wisdom -> Entrepreneurship	0.000	1.000
Entrepreneurship -> Smart green economy	0.002	0.873
ICT -> Smart green economy	0.119	0.043
Local wisdom -> Smart green economy	0.161	0.030

In addition, Table 5 presents the f^2 effect sizes, which assess the impact of exogenous constructs on endogenous variables within the model. The results indicate that the effect of ICT on entrepreneurship is large, while the effects of both ICT and local wisdom on the smart green economy are moderate. These findings

suggest that ICT is particularly influential in fostering entrepreneurial activity. In contrast, though meaningful, their and local wisdom's contributions to the smart green economy are comparatively less pronounced. Furthermore,

Table 6. Result of Predictive Relevance (Q-square)

Construct	SSO	SSE	Q^2 (=1-SSE/SSO)
Entrepreneurship	568.000	418.235	0.264
ICT	994.000	484.184	0.513
Local Wisdom	426.000	210.882	0.505
Smart green economy	426.000	146.614	0.656

Table 6 reports the Q^2 values, which measure the model's predictive relevance using the blindfolding procedure. All constructs exhibit Q^2 values greater than 0.50, except for entrepreneurship, demonstrating high predictive relevance. These results indicate the model's strong predictive accuracy, supporting its overall goodness-of-fit.

4. Discussion

In recent years, the concept of a smart green economy has gained traction as a strategic framework for promoting sustainable development, particularly in rural areas. This approach integrates three key elements: Information and Communication Technology (ICT), local wisdom, and entrepreneurship to create a dynamic system that supports economic growth, strengthens community resilience, and fosters inclusive development. ICT catalyzes innovation and connectivity, enabling rural populations to access vital information, markets, and resources previously out of reach (Anuyahong et al., 2023). It enhances communication, reduces transaction costs, and opens new avenues for business development, especially for small and medium-sized enterprises (SMEs), which benefit from global market access and cost-effective operations (Kurniawati & Chairunisa, 2023; Sianipar, 2022; Syamruddin & Yunita, 2024). Local wisdom, encompassing cultural, ecological, and social knowledge passed down through generations, adds depth and relevance to economic activities. It includes traditional practices and community-based solutions that are well-adapted to local conditions. Combined with modern technologies, it guides the development of context-sensitive and sustainable economic systems (Mardianti et al., 2022; Suriani et al., 2024; Wahyuddin et al., 2022).

Entrepreneurship plays a pivotal role by transforming ideas into action, empowering individuals to leverage ICT and traditional knowledge to create unique products and services that reflect their community's identity and values (Stevy et al., 2023). The synergy among ICT, local wisdom, and entrepreneurship forms the foundation of a smart green economy tailored to rural needs. This interconnected model enhances economic vitality, promotes environmental sustainability, and strengthens social cohesion (Mardhatillah et al., 2024). Initiatives such as agro-tourism, rooted in local traditions, have positively impacted economic, social, and environmental dimensions (Mwanza, 2022). Several enabling conditions must be met to make this model effective, including robust digital infrastructure, widespread technology adoption, digital literacy and skills training, and a supportive innovation ecosystem comprising tech firms, research institutions, and policy frameworks (Mardhatillah et al., 2024). In regions facing challenges like population decline and underinvestment, ICT can serve as a strategic tool for regeneration by attracting investment and improving quality of life (Manlio Del Giudice et al., 2012; Paulussen et al., 2011). For SMEs, ICT facilitates access to global markets, supports innovative business models, and fosters resilience and sustainability (Brenner, 2018).

Moreover, ICT-driven collaboration among businesses strengthens the entrepreneurial ecosystem, creating conditions conducive to innovation and adaptability during economic fluctuations (Lama et al., 2024). Communities embracing digital technologies can harness data analytics and digital platforms to understand market dynamics and consumer behaviour better, thereby improving their competitive edge (Manlio Del Giudice et al., 2012; Paulussen et al., 2011). This capability supports informed decision-making, efficient resource allocation, and agile responses to evolving demands. Technology adoption also enables enterprises to streamline operations, diversify revenue sources, and personalize services to enhance customer engagement (Brenner, 2018). A technology-oriented environment promotes continuous learning and skill acquisition, equipping individuals and organizations to confidently navigate future challenges (Mardhatillah et al., 2024). The widespread adoption of ICT fosters innovation and collaboration, allowing diverse teams to capitalize on their strengths and drive sustained economic growth (Manlio Del Giudice et al., 2012; Paulussen et al., 2011).

To fully unlock the transformative potential of ICT, local wisdom, and entrepreneurship in building smart green economies, stakeholders should invest in digital infrastructure aligned with local cultural and environmental

contexts, provide accessible and culturally relevant digital skills training, and design ICT applications that integrate traditional knowledge (Mwanza, 2022). Encouraging partnerships among technology companies, local enterprises, and community organizations is essential, as is implementing policy measures that protect indigenous intellectual property while fostering innovation and knowledge sharing (Mardhatillah et al., 2024). Striking a balance between preserving local wisdom and embracing digital innovation can lead to smart green economies that are both technologically advanced and culturally grounded. However, realizing this potential requires overcoming persistent barriers such as limited funding, inadequate infrastructure, and insufficient capacity-building efforts (Lama et al., 2024). By cultivating a collaborative and innovative culture, smart villages can become models of sustainable rural development, attracting talent and investment, improving public services, and enhancing the overall quality of life for their residents (Mukti et al., 2022; Yusrizal et al., 2024).

Conclusions

To foster the development of a smart green economy, this study underscores the critical role of small and medium-sized enterprises (SMEs) in integrating information and communication technologies (ICTs) with local knowledge. The findings reveal that products and services embedded with local cultural values, such as distinctiveness, heritage, and regional identity, serve as key drivers of smart economic growth. ICTs are increasingly central to business operations, enhancing efficiency, connectivity, and innovation. Notably, entrepreneurial talent does not directly influence the smart green economy; rather, it functions as a mediating factor that facilitates the effective utilization of ICT and local knowledge. Emerging evidence suggests that strategic investments in ICT infrastructure, particularly the expansion of broadband access in rural and underserved areas, are necessary to stimulate entrepreneurial activity and enhance economic dynamism In countries like Indonesia, which possess a rich tradition of cultural preservation and a vibrant SME sector, the proposed framework for advancing the smart green economy holds significant potential for regional development. This approach can catalyze innovation and inclusive economic growth by synergizing traditional knowledge systems with modern digital technologies.

However, the successful implementation of this smart green economy model hinges on two essential components: entrepreneurial competence and institutional support. Entrepreneurs must possess a nuanced understanding of local market dynamics and cultural practices, alongside the ability to harness ICT tools to enhance their business operations. Bridging the gap between traditional business practices and digital transformation may require targeted interventions, such as mentorship initiatives and specialized training programs. Simultaneously, government support is indispensable in enabling SMEs to thrive within this evolving economic landscape. Policy measures that promote infrastructure development, facilitate access to finance, and enhance digital literacy are vital. Through such support, the framework can unlock the full potential of local wisdom-based enterprises, foster sustainable economic growth while safeguard cultural heritage.

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Credit Authorship Contribution Statement

Fredi Andria: write Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review and editing, Funding acquisition.
Eneng Tita Tosida: Conceptualization, Investigation, Methodology, Project administration, Formal analysis, Writing – original draft, Writing – review and editing.
Roni Jayawinangun: Conceptualization, Investigation, Methodology, Project administration, Formal analysis, Writing – original draft, Writing – review and editing.
Jumadil Saputra: Investigation, Methodology, Software, Formal analysis, Data curation, Validation, Writing – review and editing, Visualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-assisted Technologies

The authors declare that they did not use generative AI and AI-assisted technologies during the preparation of this work.

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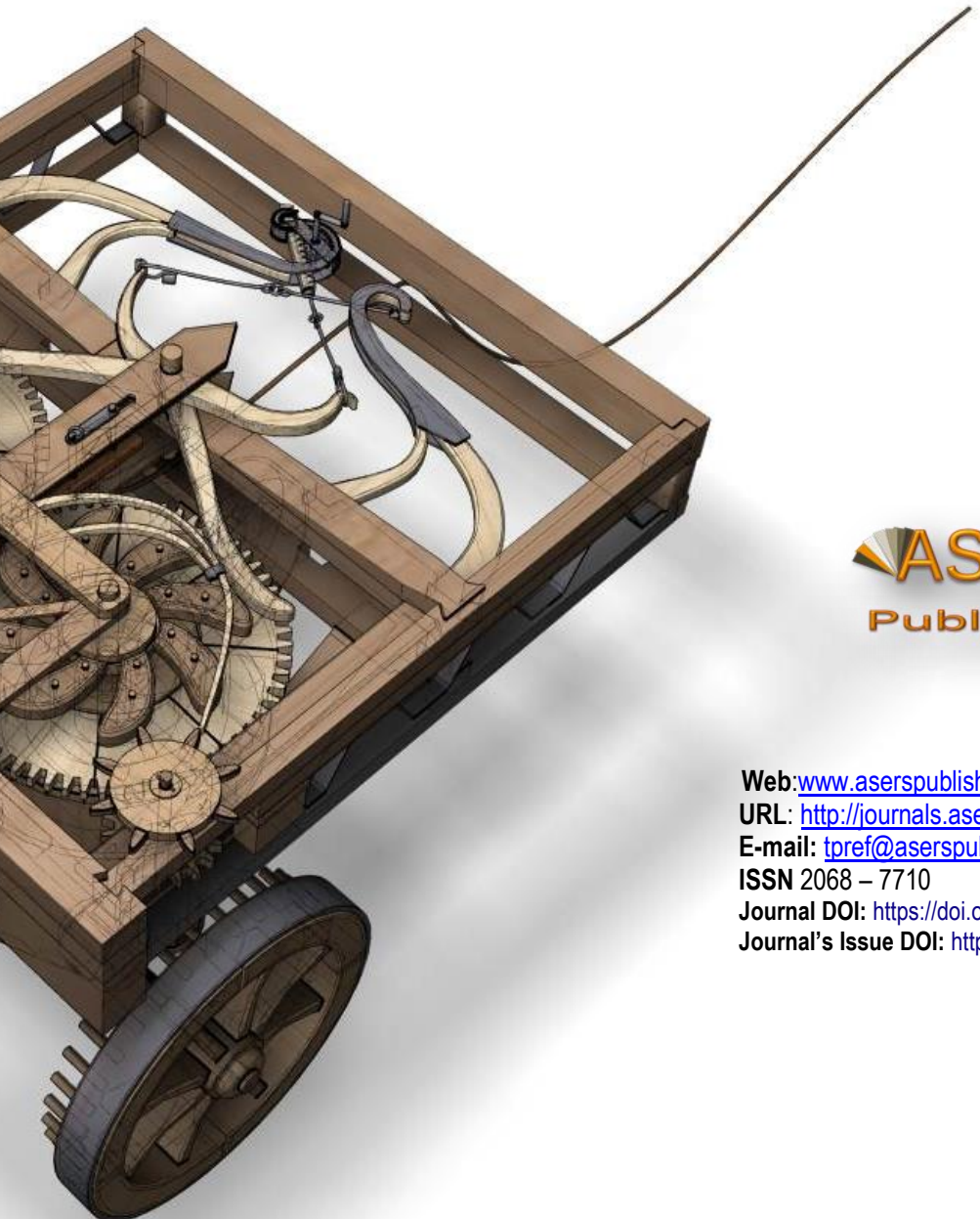

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