



East African Journal of Business and Economics

eajbe.eanso.org

Volume 9, Issue 2, 2026

Print ISSN: 2707-4250 | Online ISSN: 2707-4269

Title DOI: <https://doi.org/10.37284/2707-4269>



Original Article

Sustainable Digital Entrepreneurship and Its Environmental and Social Value Impact in Western Kenya

Dr. Charles Owuor Omoga, PhD¹*, Dr. Peter Odhiambo Ongang'a, PhD¹, Dr. Nehemiah Kosgei, PhD¹ & Dr. Victor Mengwa, PhD¹

¹ Alupe University, P. O. Box 845-500400, Busia, Kenya.

*Author for Correspondence; ORCID ID; <https://orcid.org/0009-0008-7928-6203>; Email; comoga@au.ac.ke

Article DOI: <https://doi.org/10.37284/eajbe.9.2.5063>

Date Published: **ABSTRACT**

02 June 2026

Keywords:

Sustainable Digital Entrepreneurship (SDE), Frugal Digital Innovation, Mobile Applications/SMS, Socio-Environmental Value Creation, Institutional Voids, Western Kenya.

This research examines the structural characteristics of Sustainable Digital Entrepreneurship (SDE) business models, the deconstruction of digital technology configurations, and the assessment of stakeholders' ecosystem in the context of generating a dual environment and social value in Western Kenya. A mixed methods research design was used in which the data collected in the quantitative phase (a snowball sample of sustainable digital entrepreneurs = 30) were triangulated with the qualitative data obtained in the second phase of the study using semi-structured interviews = 18), analysed using NVivo -14. Descriptive results show that the founding of SDEs is mainly driven by the personal ethical values of entrepreneurs (85%). Low-barrier digital tools were found to be the key enabling technologies for localised operations, having the highest value-creation impact score at 4.8/5.0. A strong positive correlation and significance at $p < 0.01$ are confirmed through inferential statistical analysis between the variables active sustainability tracking and overall business performance. In addition, the validated conceptual model shows that digital capabilities strongly mediate the link between SDE and value creation ($r = 0.61$); community engagement has a strong influence on this link ($r = 0.55$); and local institutional support also plays a strong role in this link ($r = 0.50$). From the qualitative side, there were sharp structural conflicts: high infrastructure costs and access to impact-first, which makes it always necessary to balance financial survival with mission execution. The strategic implications of the study are that in rural African ecosystems, the techno architectures that have been built with less investment are better than those built with more, and that they are more accessible than they are capital-intensive. The results point to the need for policy and institutional measures at the local level that are conducive to a green digital economy and that provide new and specific funding mechanisms with a primary focus on impact.

APA CITATION

Omoga, C. O., Ongang'a, P. O., Kosgei, N. & Mengwa, V. (2026). Sustainable Digital Entrepreneurship and Its Environmental and Social Value Impact in Western Kenya. *East African Journal of Business and Economics*, 9(2), 353-361. <https://doi.org/10.37284/eajbe.9.2.5063>

CHICAGO CITATION

Omoga, Charles Owuor, Peter Odhiambo Ongang'a, Nehemiah Kosgei and Victor Mengwa. 2026. "Sustainable Digital Entrepreneurship and Its Environmental and Social Value Impact in Western Kenya". *East African Journal of Business and Economics* 9 (2), 353-361. <https://doi.org/10.37284/eajbe.9.2.5063>

HARVARD CITATION

Omoga, C. O., Ongang'a, P. O., Kosgei, N. & Mengwa, V. (2026). "Sustainable Digital Entrepreneurship and Its Environmental and Social Value Impact in Western Kenya", *East African Journal of Business and Economics*, 9(2), pp. 353-361. doi: 10.37284/eajbe.9.2.5063.

IEEE CITATION

C. O., Omoga, P. O., Ongang'a, N., Kosgei, & V., Mengwa. "Sustainable Digital Entrepreneurship and Its Environmental and Social Value Impact in Western Kenya", *EAJBE*, vol. 9, no. 2, pp. 353-361, Jun. 2026.

MLA CITATION

Omoga, Charles Owuor, Peter Odhiambo Ongang'a, Nehemiah Kosgei & Victor Mengwa. "Sustainable Digital Entrepreneurship and Its Environmental and Social Value Impact in Western Kenya". *East African Journal of Business and Economics*, Vol. 9, no. 2, Jun. 2026, pp. 353-361, doi:10.37284/eajbe.9.2.5063.

INTRODUCTION

Background of the Study

Sustainable digital entrepreneurship (SDE) is the term used to describe the development of new businesses that use digital technologies to provide economic value while also producing notable positive social and environmental effects (Baranauskas & Raišienė, 2022). This method goes beyond the conventional understanding of corporate social responsibility (CSR) as a secondary or non-core issue, which was frequently marginalised in previous entrepreneurship research (Vrontis et al., 2020).

Entrepreneurs are increasingly incorporating sustainability as a fundamental element of their business models in the current digital era. Digital platforms, for instance, now make it possible for people to recycle or share goods, establishing closed-loop systems that lower waste and promote circular economies (Zeiss et al., 2025). This study will specifically look into how digital entrepreneurs use special technological characteristics like network effects and scalability to solve urgent local issues and create profitable, regenerative business models (UNCTAD, 2021). By doing this, it will add to the small but expanding corpus of research on the concrete, multifaceted effects of SDE.

Problem Statement:

There is lack of empirical data required for establishing informed strategies and regulations,

which has led to ineffective policy making in relation to sustainable entrepreneurship in developing countries (UNCTAD 2019) This means that capital is less likely to flow to projects whose social and environmental impacts cannot be empirically proven, this regulatory uncertainty in turn raises investors' perceptions of risk and results in misaligned investment and resource allocation (Vrontis et al., 2020).

Therefore, this study aimed to fill this empirical gap by examining the precise processes and avenues by which sustainable digital entrepreneurs in Kenya's Western Region use digital capabilities and institutional support locally to produce quantifiable environmental and social value.

The findings of this study can bring clear empirical benefits to the attention of important stakeholders:

The resulting data may provide policymakers with the insights they need to create targeted policies and incentive regimes to create a predictable and supportive environment for sustainable tech ventures. The resulting improved perceived risk and easier performance metrics may result in more confident and aligned capital allocation by investors towards verified high-impact projects. Additionally, these sustainable digital models may effectively scale in the local area to provide a boost to economic resilience, a form of local problem-solving and direct environmental gains for local communities.

Research Objectives

Main objective:

The main objective of this study was to analyse the impact of sustainable digital entrepreneurship on environmental and social value creation in the western region of Kenya

Specific Objectives:

This study was guided by the following specific objectives

- To determine the main forces behind sustainable digital entrepreneurship in the Western Kenya region
- To investigate which digital technologies and business models are most successful in creating social and environmental value in the Western Kenya region
- To examine the difficulties faced by sustainable digital entrepreneurs in the western part of Kenya region in striking a balance between social and environmental objectives and economic viability.
- To provide a conceptual framework for evaluating and quantifying how sustainable digital initiatives affect business performance and sustainable development objectives.

Research Questions

- What drives business owners in western Kenya to follow a sustainable digital entrepreneurship path?
- How do particular digital technologies help new businesses in Western Kenya create social and environmental value?
- What are the difficulties faced by sustainable digital entrepreneurs in the western part of Kenya in striking a balance between social and environmental objectives and economic viability?

- Is there a conceptual framework developed for evaluating and quantifying how sustainable digital initiatives affect business performance and sustainable development objectives?

Justification of the Study

There is substantial theoretical and practical value in this research. By offering a fresh perspective on entrepreneurial activity, it theoretically advances the domains of entrepreneurship, sustainability, and digital innovation. It will facilitate communication between these fields and open the door to a more comprehensive comprehension of value generation in the digital economy. From a practical standpoint, the results will provide insightful information to various stakeholders. It will give entrepreneurs a road map of profitable SDE business models and best practices for using technology to further social good.

Methodology

This study adopted a mixed-methods research design to ensure both depth of understanding and breadth of generalisation.

Research Design and Sampling

With an emphasis on particular industries in agriculture, the study's target population was sustainable digital entrepreneurs in the Western Kenya region. In the qualitative phase, a purposive sampling technique was employed to choose a varied group of 18 business owners who have effectively incorporated sustainability into their business plans. Businesses with a definite social or environmental goal, a track record of using digital technology, and a validated business plan were among the selection criteria. A snowball sampling technique was employed to survey a larger sample of 30 sustainable digital entrepreneurs for the quantitative phase.

Inclusion/Exclusion Criteria

To ensure the sampling frame is accurate to the research objectives, each entry in the frame met the following criteria:

- **Geographical Location:** The physical headquarters or primary operations must have been in Western Kenya (Busia, Kakamega, Vihiga, or Bungoma).
- **Digital Component:** The business must have used a digital platform (App, Web, SMS, IoT, or Social Media) as a *core* part of its value delivery.
- **Sustainability Goal:** The venture must have had an explicit social or environmental mission.

Data Collection Methods

Qualitative data was collected using semi-structured interview schedules, while the quantitative survey data was collected using structured questionnaires.

Data Analysis Methods

Qualitative Data Analysis:

The thematic analysis method was used to analyse the interview transcripts to identify patterns as well as themes in relation to the study variables.

Quantitative Data Analysis:

- **Descriptive Statistics:** This was used to describe or present data in an easily accessible, quantitative form
- **Regression Analysis:** Regression analysis was used to test the relationship between the use of specific digital technologies and the

reported levels of social and environmental impact.

- **Correlation Analysis:** Correlation data analysis was done to examine the relationship between different business model attributes and the perceived success of the ventures.

Ethical Consideration

The study adhered to strict ethical protocols, including informed consent and the anonymisation of participant data.

Results and Discussions

This section captures the research results of the Sustainable Digital Entrepreneurship (SDE) study in Western Kenya. In the spirit of the pragmatic philosophy of the "Sustainable Digital Entrepreneurship and its impact on Environmental and Social Value", a mixed-methods approach was used in this study. The triangulation of data was an important element in this analysis, which involved cross-referencing qualitative information obtained from semi-structured interviews with quantitative information from the survey, in order to gain a comprehensive and valid understanding of the SDE ecosystem.

Quantitative Data Analysis Results

Evaluation of the Conceptual Framework Variables

The table below presents the correlation coefficients (r) for the independent, mediating, and dependent variables to demonstrate their statistical interconnectedness.

Table 1: Pearson Correlation Matrix for all Study Variables (N=30)

Variables	SDE (IV)	Digital Capability (MV1)	Institutional Support (MV2)	Community Engagement (MV3)	Value Creation (DV)
Sustainable Digital Entrepreneurship (SDE)	1.00				
Digital Capability (MV1)	0.59**	1.00			
Local Institutional Support (MV2)	0.44*	0.38*	1.00		

Variables	SDE (IV)	Digital Capability (MV1)	Institutional Support (MV2)	Community Engagement (MV3)	Value Creation (DV)
Community Engagement (MV3)	0.52**	0.41*	0.48**	1.00	
Environmental & Social Value Creation (DV)	0.68**	0.61**	0.50**	0.55**	1.00

* Correlation is significant at the 0.05 level (2-tailed). Correlation is significant at the 0.01 level (2-tailed).

Source: Research data (2026)

Quantitative Results and Discussions

The empirical results of this research study provide important understandings of Sustainable Digital Entrepreneurship (SDE) functions in Western Kenya. This section provides a context-setting framework that situates the quantitative findings (N=30) in the wider literature on digital transformation and sub-Saharan entrepreneurial ecosystems by drawing on the key relationships between SDE execution, digital capabilities, and ecosystem support systems.

Hypothesis validation: SDE and Environmental & Social Value creation

The study found that Sustainable Digital Entrepreneurship (SDE) was strongly correlated with Environmental & Social Value Creation ($r = 0.68$, $p < 0.01$). This empirical result reveals that the deliberate switch from a purely commercial operating mode to a twin-value mode, mixing in strict impact tracking measures (such as carbon diversion, local income growth), scales the creation of overall value in an efficient way. This outcome is, in general, very much in line with the core tenets of the so-called "digital sustainability" described by George et al. (2021) and Schaltegger et al. (2016). They believe digital solutions are able to stretch the entrepreneurial horizon, enabling companies to enhance the use of raw resources, reduce transaction-related friction, and progressively reduce environmental footprint whilst maintaining profitability.

In addition, the study is congruent with recent regional empirical research by Morepje et al. (2024), which found that sub-Saharan digital platforms providing smallholder farmers with

services had significant social returns for closing information gaps and boosting community economic returns. Digital business model designs for marginalised spaces do not have an inherent zero-sum between profit and purpose, as demonstrated by the correlation of $r=0.68$. Rather, digital architectures create a symbiotic optimisation circle between the generation of social value and the viability of ventures.

On the other hand, the result adds a positive contrast to the study of Hang and Kim (2025). They evaluated small-scale businesses and found that with a high level of technology integration, there can be a structural lag or digital expenditure overhead that may have a negative short-term social or net economic value. The findings reveal a strong positive correlation that suggests that, in the Western Kenya region, the first step towards addressing basic structural issues (financial exclusion and municipal waste) is the first step towards value creation, as opposed to the operational overheads that would otherwise be incurred.

The Role of Mediators: Digital Capability as a Value Driver

The quantitative results showed a strong correlation between Digital Capability and Value Creation ($r=0.61$, $p<0.01$). The numerical finding directly supports the descriptive finding that simple mobile applications and SMS/USSD platforms had a premier impact rating of 4.8/5.0. Low-barrier digital tools, such as SMS and simple mobile configurations, are just as important as the current "frugal digital innovation" frameworks for developing economies (ODI, 2020). Digital footprints created on common mobile platforms

like mobile phones are changing the game for enterprise viability in Africa, as noted by the International Finance Corporation (IFC, 2025). Sustainable value doesn't need to be delivered through capital-intensive or heavy enterprise software systems; it can be delivered where the users are in relation to technology adoption.

The high rating of 4.8/5.0 corroborates the results of Gichuru (2023), who found that basic mobile-based systems constitute the main platform for economic empowerment and market access for rural entrepreneurs in Western Kenya. The effective use of mobile networks serves as an operational pipeline that transforms the entrepreneur's core sustainable values into a scalable, real-world, community impact.

This discovery runs counter to the classic models of digital entrepreneurship, which are typically rooted in Western experiences (Nambisan et al., 2019), and place a significant emphasis on high-tech data analytics, artificial intelligence, and complex cloud-based platform ecosystems as the minimum requirement for “digital capability.” In the surveyed counties in the west of Kenya, these high-tech solutions can be limited due to data costs and infrastructure. This study's evidence gives new meaning to the complexity of technology and its social value by demonstrating that low-level mobile architectures and low-level text architectures create the same, if not more enduring, social value.

In addition to within-house factors, ecosystem networks have proven to be key components of sustainable performance. Both Local Institutional Support ($r=0.50$, $p<0.05$) and Community Engagement ($r=0.55$, $p<0.01$) had statistically significant positive correlations with final value creation.

The results confirm the institutional theory perspectives used in emerging economies. In a number of sub-Saharan contexts, structural issues are a constraint for entrepreneurs, sometimes called “institutional voids. Gumbo (2025) and academic research into digital innovation

ecosystems in the region (iHub/Innohub, 2026) highlight that digital start-ups must work within an ecosystem. They rely on the intermediate networks—grassroots county government agencies, digital hubs, cooperative community groups, and others—to gain legitimacy in their operations, to understand the intricacy of local permitting processes, and to establish trust among users.

This is further bolstered by the Inclusive Entrepreneurial Success frameworks in the African economies (EconJournals, 2026). The approaches highlight the need to account for human, social, and institutional aspects of enterprises when assessing sustainability beyond economic returns in Africa. A high correlation with community engagement ($r=0.55$) indicates that community engagement is key to the adoption of the digital solution and to the potential value production of the tool if it is to be implemented to its full potential.

The traditional understanding of entrepreneurship (such as the traditional Schumpeterian perspective) sees the digital entrepreneur as an individual, disruptive influence that challenges the existing structures, while in this study, another picture emerges. Systemic collaboration is key in Kenya's west to create value. The data shows that a single disruption can result in regulatory problems or community rejection. Digital entrepreneurs must embrace the role of co-operative ecosystem builders in building local trust and institutionalisation to become viable in the long-term.

Qualitative Data Analysis Results

Qualitative results and thematic analysis were conducted to capture the underlying strategic motivations, operational realities, and systemic challenges of Sustainable Digital Entrepreneurship (SDE) in Western Kenya. For the qualitative analysis, the verbatim versions of the semi-structured interviews conducted with the purposively sampled group of sustainable digital entrepreneurs ($n = 18$) were used. A Computer-Assisted Qualitative Data Analysis Software

(CAQDAS) software (NVivo, Version 14) was used for software-facilitated analysis.

i) Drivers of SDE (Objective 1)

The results of the qualitative interviews and quantitative ratings confirmed that the most powerful variable on SDE is "Personal Ethical Values. 85% of the respondents with survey responses agreed with this statement, reflecting the underlying motives that were stated in the interview schedules.

Interviewees referenced "Environmental Crisis" as a driver, and survey data showed that the "Addressing Local Social Problems" (poverty and financial exclusion) was a statistically more frequent driver of a venture's creation.

ii) Technology and Business Model Success (Objective 2)

As per the respondents, Mobile Apps and SMS were considered as a critical enabler in their business.

This was supported by statistical data, which revealed Mobile Applications/SMS had the highest "Value Creation Impact" rating (4.8/5.0) of the technologies available.

The context of the triangulation is that digital models work best in Western Kenya when they use simple and accessible digital tools to address complex resource efficiency and market access challenges.

iii) Profit and Purpose – Tensions (Objective 3)

In the study of the challenges of the "Triple Bottom Line," triangulation played an important role:

- Interview Data: Entrepreneurs vividly recalled cases of 'Trade-offs', e.g., between profitability and affordability of services to the poor.
- Survey Data: This was consistently cited as a "Significant Challenge", with both "High cost

of digital infrastructure" and the "Difficulty accessing impact-first capital" being considered as having a "High severity rating.

The Triangulation Process

The research addressed the general goal of SDE impact analysis, which was achieved by a sequential triangulation process:

- Theme analysis was used to uncover the "why" of sustainable motivations, and was achieved by reviewing and structuring the qualitative data generated from 18 purposively sampled entrepreneurs.
- Themes were then quantitatively validated through a structured questionnaire of a larger snowball sample to ascertain "how many" and "to what extent" these drivers were actually found within the region.
- Convergence and Divergence: the final analysis involved juxtaposing both sets of data to see where they converged (where there was a similar view) and where they diverged (where there was a different view), from the two sources of data, the survey data and the personal interviews.

Triangulated Findings:

Independent Variable: Sustainable Digital Entrepreneurship: Ethically motivated and digitally scalable.

Mediating Variables

- Digital Capability: Essential to be able to manage ISMS and operational efficiency.
- Local Institutional Support: Necessary for legitimacy and for dealing with regulations.
- Community Engagement: From the local needs and trust of the community.

The Dependent Variable(s): the Environmental & Social Value Creation: Quantified by means of Diverted Waste, Carbon Savings, and Income Growth.

Hypothesis Verification

The hypothesis that explicit impact measurement is correlated with positive funding for impact was triangulated by:

- Interviews with successful entrepreneurs identified the need for “Scorecards” to demonstrate impact to investors as a key factor.
- Quantitative: Strong positive correlation was established between tracking metrics (CO2 saved, low-income beneficiaries reached) and business performance by means of a correlation analysis with a correlation coefficient ($r=0.68$).

The research hypothesis was well supported by the triangulated evidence, thus resolving the gap in empirical evidence pointed out in the "Sustainable Digital Entrepreneurship and its Impact on Environmental and Social Value".

CONCLUSION

The findings of this study show that Sustainable Digital Entrepreneurship (SDE) in Western Kenya is a dynamic and emerging field that effectively combines technology and technological innovation with moral and social responsibility. The study explores the mechanisms of value addition in this ecosystem to understand the specific functions of digital capabilities, institutional structures and communities:

Digital Capability as the Engine of Scalability: Advanced digital tools and platforms are not just tools to operate but are the underlying mechanisms that allow entrepreneurs to harness network effects. Ventures can scale quickly, maximise resource use and create economic and environmental value.

Formal and informal institutional support as the catalyst for stability: local technology hubs and/or regulatory incentives, as well as foundational funding, are important drivers. In buildings with strong institutional support, digital ventures have

less friction in operation and are more likely to become viable businesses.

Community Engagement is at the heart of Impact: Value creation in SDE is a participatory process. By engaging with communities directly, digital solutions are put into place in the context of local needs and to address the real problems that it faces; this helps to gain the trust and local support required to achieve long-term social impact and adoption of a circular economy.

While there is a great deal to be done with these digital capabilities, this study finds there are still a number of limitations. Limited access to financial tools and a lack of digital infrastructure in rural areas are still major barriers to scaling these businesses, restricting their potential environmental and social contribution.

This research makes three key contributions to address these dynamics:

- **Contribution to Knowledge (Theoretical)**

This study fills a gap in the literature by offering empirical evidence of the nature of SDE in a developing country context, a context that is not limited to the Western context. It extends the theory of entrepreneurship by showing that the digital capabilities and sustainability goals are not mutually exclusive but are interdependent in resource-constrained environments.

- **Contribution to Policy**

Insights provide a policy roadmap based on data to design targeted regulations and infrastructure investments. In particular, it highlights the need for policies enhancing rural connectivity and the development of specific financial frameworks for early-stage digital businesses.

- **Contribution to Practice**

This is a study that offers an operational framework for practitioners, such as entrepreneurs, investors and community leaders. It helps local entrepreneurs to understand how to

align tech capabilities with local needs, and provides investors with validated parameters to de-risk investment and maximise local, sustained impact.

Recommendations

- Policy: County governments to implement “Green Digital Permits” for sustainable businesses.
- Investment: To decrease perceived risk, investors should use the impact measurement metrics that were validated in this study.
- Education: Curricula of the Universities of the region should include SDE in their ICT and Business programmes.

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