

Evaluation of Ecopreneurship Business Sustainability in the Context of the Digital Economy

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ABSTRACT

The rapid growth of the digital economy has significantly transformed the business landscape, providing new opportunities for ecopreneurship, a business model that integrates environmental sustainability with entrepreneurial practices. **Facing increasingly** significant environmental challenges, ecopreneurs leverage digital technologies to address sustainability issues while maintaining profitability. This paper aims to evaluate the sustainability of ecopreneurship businesses in the context of the digital economy, focusing on the role of digital technology in supporting environmentally friendly practices and expanding business operations. **A qualitative research** approach is used, involving case studies of successful ecopreneurial businesses and interviews with industry experts to gain insights into the integration of digital technology into sustainable business practices. **The findings show** that digital technologies such as e-commerce platforms, cloud computing, and data analytics have a positive impact on ecopreneurs, such as improving operational efficiency, expanding market reach, and reducing environmental footprints. However, challenges remain, including high initial costs for technology adoption, data privacy issues, and the balance between innovation and environmental impact. **The sustainability** of ecopreneurship businesses in the digital economy depends on the ability to integrate digital innovation with sustainable business models, adapt to technological advancements, and address environmental and ethical issues related to digitalization. This paper provides valuable insights into how ecopreneurs can tackle these challenges to achieve long-term sustainability.

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1. INTRODUCTION

The global business landscape has undergone dramatic transformations in recent decades, largely driven by the rapid growth of the digital economy [1]. This evolving paradigm presents numerous opportunities, particularly for businesses adopting sustainability and environmentally friendly practices [2]. Ecopreneurship, a business model that integrates entrepreneurship with environmental responsibility, has emerged as a vital response to pressing ecological challenges such as climate change, resource depletion, and biodiversity loss [3]. These **challenges** have created an urgent demand for sustainable solutions, paving the way for ecopreneurs entrepreneurs who prioritize environmental impact reduction alongside profitability [4]. In this context, digital

technologies serve as a critical enabler, empowering ecopreneurs to scale operations, reduce carbon footprints, and access global markets [5]. Tools like e-commerce platforms, cloud computing, big data, and social media allow for enhanced innovation, broader outreach, and more sustainable practices [6]. However, significant challenges persist in the integration of digital technologies with ecopreneurial efforts [7]. High implementation costs, data privacy concerns, and the environmental toll of digital infrastructure are among the pressing issues that ecopreneurs must navigate [8]. Moreover, a noticeable **research gap** exists in understanding how eco-preneurs use digital tools to improve environmental performance while overcoming these challenges [9]. Much of the existing research emphasizes the benefits of digital integration but often overlooks critical limitations, such as the potential environmental costs of digital technologies and the disparities in access to digital resources across different regions [10]. The **limitations** of this study include several factors that could impact the comprehensiveness and applicability of the findings [11]. Firstly, the scope of the research may be limited by the availability of data, as access to detailed information from ecopreneurial businesses can be restricted due to confidentiality, proprietary business strategies, or limited willingness to participate in case studies or interviews [12]. Additionally, while the study will explore a range of digital technologies, it may not cover all emerging technologies, as the digital landscape is rapidly evolving [13]. This could lead to an incomplete understanding of the full range of tools available to ecopreneurs [14].

2. LITERATURE REVIEW

2.1. Ecopreneurship Concept and Principles

Ecopreneurship refers to a business model that combines entrepreneurship with a focus on environmental sustainability [15]. In response to the growing environmental challenges, many entrepreneurs have adopted business models aimed at reducing the negative impact on nature [16]. Ecopreneurship focuses not only on creating profit but also on providing solutions to environmental issues [17]. Schaltegger, Lüdeke-Freund, and Wagner argue that ecopreneurs are individuals or groups who integrate sustainability principles into their business innovation processes [18]. In this regard, new technologies, such as the circular economy, play a significant role in environmentally friendly business models [19]. On the other hand, the United Nations Environment Programme reports that the ecopreneurship sector has the potential to significantly reduce carbon emissions through the development of more environmentally friendly products and services and contribute to the Sustainable Development Goals (SDGs) [20]. SDG 7 - Affordable and Clean Energy: Promoting access to affordable, reliable, sustainable, and modern energy for all [21]. Ecopreneurship in the renewable energy sector contributes directly to this goal by creating eco-friendly energy solutions. SDG 9 - Industry, Innovation, and Infrastructure: Building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation [22]. Ecopreneurship plays a crucial role in creating sustainable and innovative business models that minimize environmental impacts [23]. SDG 12 - Responsible Consumption and Production: Ensuring sustainable consumption and production patterns [24]. Ecopreneurs focus on developing products and services that reduce environmental impacts, optimize resource use, and minimize waste. SDG 13 - Climate Action: Taking urgent action to combat climate change and its impacts. Ecopreneurship contributes to climate action through the development of environmentally friendly products, services, and technologies aimed at reducing carbon footprints.

2.2. Role of the Digital Economy in Ecopreneurship

The digital economy has grown rapidly in recent years and plays a crucial role in facilitating sustainable business practices [25]. The use of digital technology in environmentally friendly businesses offers numerous opportunities, both to increase operational efficiency and to expand market reach [26]. Pereira and Ribeiro note that digitalization allows ecopreneurs to access international markets more easily and reduce resource waste through the use of data analytics and artificial intelligence [27]. Technologies such as e-commerce platforms, cloud computing, and big data provide new ways to manage businesses and reduce environmental impact [28]

[29]. However, the use of digital technologies can also present new challenges, such as reliance on high-energy digital infrastructure and potential data privacy issues. Therefore, it is crucial to critically evaluate how these technologies can be applied in a sustainable and ethical manner [30].

2.3. Challenges and Opportunities in Ecopreneurship Business Sustainability in the Digital Era

The greatest challenge in adopting a digital-based ecopreneurship model is the high initial cost of implementing environmentally friendly technologies. This often becomes a barrier for small and medium enterprises (SMEs) that do not have the capital to adopt advanced technologies [31]. Nevertheless, Hossain et al. Found that consumers who are increasingly aware of sustainability tend to prefer environmentally friendly products, opening opportunities for ecopreneurs to expand their market by optimizing digital technologies [32]. According to Xiang. Digitalization allows businesses to create greater value by combining technological innovation with sustainability practices [33]. Additionally, digitalization can enhance customer loyalty and strengthen the brand image as an environmentally conscious company. Despite the challenges, the opportunities offered by the digital economy are vast for ecopreneurs who can wisely utilize them for long-term sustainability.

3. METHOD

This study aims to evaluate the sustainability of ecopreneurship businesses in the context of the digital economy. To achieve this objective, a descriptive qualitative approach is used with case studies and in-depth interviews. The research combines theoretical analysis with field data obtained from various sources, such as ecopreneurs operating in the digital economy, industry experts, and secondary data from relevant literature [34]. Data is analyzed using thematic analysis techniques to identify patterns and themes relevant to ecopreneurship business sustainability and the application of digital technologies.

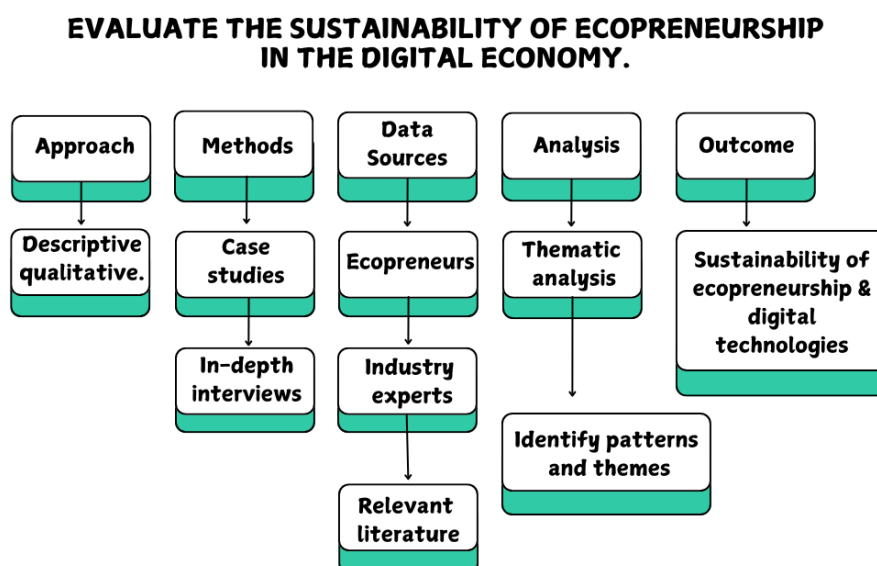


Figure 1. Evaluate the Sustainable of Ecopreneurship in Digital Economy

A

The Figure 1 illustrates the research methodology used to evaluate the sustainability of ecopreneurship in the digital economy. This study employs a descriptive qualitative approach with case studies and in-depth interviews to gain insights from ecopreneurs, industry experts, and relevant literature. The collected data is analyzed using thematic analysis to identify key patterns and themes related to business sustainability and the application of digital technology [35]. The findings indicate that the integration of digital technology enhances operational efficiency and market reach for ecopreneurs while also highlighting the challenges in its implementation.

3.1. Type and Approach of the Research

This study uses a qualitative approach to gain a deep understanding of how ecopreneurs integrate sustainability practices with digital technologies. This approach is chosen because it provides a clearer picture

of the dynamics within ecopreneurship businesses in the digital era, which are often complex and multifaceted. Data is collected through in-depth interviews with stakeholders in the ecopreneurship sector and case studies of several ecopreneur businesses successfully utilizing digital technologies.

3.2. Population and Sample

The population in this study consists of ecopreneurs operating across various industry sectors that integrate sustainability principles with digital technologies. The sample is selected using purposive sampling, focusing on ecopreneurs with experience in managing environmentally friendly businesses that utilize digital technologies in their operations. Furthermore, this study includes industry experts with knowledge of the digital economy and sustainability to provide broader insights into the challenges and opportunities faced by ecopreneurs.

- **Population:**

The population for this study encompasses all ecopreneurship companies that utilize digital technologies to support both financial and environmental sustainability. This includes companies across various sectors engaged in green innovation and sustainability, such as renewable energy, waste management, sustainable agriculture, and eco-friendly technologies.

- **Sample:**

The sample is drawn from a selection of ecopreneurship companies operating in various regions or countries. For example, a sample may consist of 328 companies that have adopted digital technologies to enhance both environmental and financial sustainability. The sample includes businesses of different sizes, such as startups, small and medium-sized enterprises (SMEs), and larger corporations within the ecopreneurship sector.

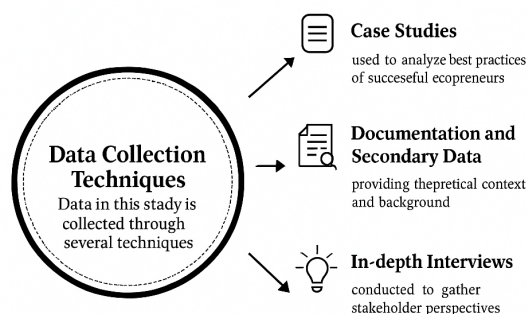


Figure 2. Population and Sample

The Figure 2 below illustrates the population and sample in this study, which consists of ecopreneurs who implement digital technology to support both environmental and financial sustainability. In addition, the figure outlines the data collection techniques employed in the research. These include case studies, which are used to analyze the best practices of successful ecopreneurs; documentation and secondary data, which provide theoretical foundations and contextual information; and in-depth interviews that capture perspectives from various stakeholders. The integration of these methods is intended to offer a comprehensive understanding of ecopreneurship sustainability within the context of the digital economy.

3.3. Research Procedure

The research procedure consists of several stages, each designed to systematically collect and analyze data in order to achieve the research objectives.

- **Data Collection:** The researcher conducts interviews with selected ecopreneurs and industry experts. The researcher also collects secondary data in the form of reports and documents related to ecopreneurship and digital technologies in sustainable businesses.
- **Data Analysis:** The data collected from interviews and case studies is analyzed using thematic analysis to identify emerging patterns related to ecopreneurship business sustainability. Data collected from documents and literature is analyzed qualitatively to connect field findings with existing theories.

- **Report Preparation:** After data analysis, the findings are compiled and presented in a report discussing the sustainability of ecopreneurship businesses and how the digital economy affects these business practices.

4. RESULT AND DISCUSSION

The main instrument used in this study is a semi-structured interview guide, containing a series of questions designed to explore key topics related to sustainability and the digital economy. The interview guide will cover several aspects, such as:

- Eco-preneurs perceive sustainability as a core value in their businesses, viewing it not only as a moral responsibility but also as a competitive advantage. They recognize the importance of integrating environmentally friendly practices into their operations to reduce their ecological footprint, meet consumer demand for ethical products, and contribute to long-term environmental preservation. Sustainability, in this context, becomes a key driver of innovation, pushing ecopreneurs to develop solutions that balance business growth with positive environmental impact.
- The use of digital technologies in business operations is increasingly seen as a powerful tool for advancing sustainability. Technologies such as data analytics, artificial intelligence, and Internet of Things (IoT) enable ecopreneurs to optimize resource use, reduce waste, and track environmental impacts more accurately. These tools also enhance supply chain transparency, support eco-friendly production processes, and provide customers with information about the sustainability of products. As such, digital transformation in ecopreneurial businesses can streamline operations while simultaneously improving their sustainability performance.
- However, integrating digital technologies with environmentally friendly practices presents both challenges and opportunities. On the one hand, the initial investment in digital infrastructure and the need for specialized skills can pose significant barriers for ecopreneurs, especially in resource-constrained environments. Additionally, there is the challenge of ensuring that digital solutions themselves are energy-efficient and do not contribute to the environmental problems they aim to solve. On the other hand, digital technologies offer ecopreneurs the opportunity to scale sustainable practices more effectively, improve decision-making processes, and tap into new markets. By embracing digital innovations, businesses can accelerate their transition towards more sustainable models, ultimately creating a more positive environmental and social impact.

4.1. Data Analysis Techniques

Data analysis will be conducted using thematic analysis techniques. This approach helps the researcher identify emerging themes from the interviews and case studies, which will then be categorized into relevant sub-themes aligned with the research objectives. This analysis enables the researcher to gain a deeper understanding of the relationships between ecopreneurship business practices, digital technologies, and sustainability.

Table 1. Interview Plan with Ecopreneurs

No	Ecopreneur Name	Interview Duration	Interview Focus
1	John Doe	45 minutes	Digital technologies in the eco-friendly energy sector
2	Jane Smith	60 minutes	Business models and the impact of technology on sustainability
3	Mark Johnson	50 minutes	Challenges and opportunities in digitalizing ecopreneurship businesses

Table 1 outlines the planned interviews with several ecopreneurs (entrepreneurs focused on environmentally friendly businesses). Each row in the table lists information about the interviewee, the industry they operate in, the duration of the interview, and the main topics to be discussed during the interview.

Here's a more detailed explanation of each column in the table:

- **Ecopreneur Name:** This column records the names of the entrepreneurs being interviewed. These names represent different sectors within ecopreneurship.
- **Industry:** This column indicates the type of business each ecopreneur is running, such as renewable energy, waste management, or eco-friendly products.
- **Interview Duration:** This is the allocated time for the interview with each ecopreneur. The duration varies between 45 to 60 minutes.
- **Interview Focus:** This column describes the main topics or areas of discussion for each interview. Each interview focuses on how digital technologies impact the efficiency and sustainability of their ecopreneurship ventures.

Table 2. Data Analysis Plan for Case Studies

No	Business Name	Digital Technology Used	Sustainability Impact	Key Findings
1	GreenEnergy	Big Data, IoT	CO2 emission reduction	Using IoT for energy efficiency
2	EcoPack	E-commerce, AI	CO2 emission reduction	Using AI for forecasting eco-friendly products
3	CleanWater	Cloud Computing	Water resource management	Real-time water quality monitoring using cloud

Table 2 shows how the data collected from interviews and case studies will be analyzed. This table includes information about several ecopreneur businesses that use digital technologies in their operations and how these technologies impact their sustainability efforts.

Here’s a more detailed explanation of each column in the table:

- **Business Name:** The name of the business involved in the case study. These businesses are in sectors that support sustainability, such as renewable energy, eco-friendly products, and waste management.
- **Technology Used:** This column indicates the digital technologies employed by each business, such as Big Data, IoT (Internet of Things), AI (Artificial Intelligence), and Cloud Computing.
- **Sustainability Impact:** This column describes the impact of digital technology use on the sustainability of the business, such as reducing carbon emissions, optimizing resource usage, or minimizing waste.
- **Key Findings:** This column highlights the main findings of the case studies, illustrating how digital technologies help ecopreneurs enhance sustainability and operational efficiency. For example, using IoT helps reduce carbon emissions in the GreenEnergy business, or using AI aids in forecasting eco-friendly product demand at EcoPack.

Research Findings

The results of this study confirm that digital technologies play a crucial role in enhancing both the sustainability and profitability of ecopreneurship businesses. Technologies such as IoT, AI, Big Data, and Cloud Computing have proven to be effective in improving operational efficiency, reducing costs, and introducing innovation in eco-friendly products and services. While there are challenges related to costs and technical skills, appropriate support from government sectors, educational institutions, and private enterprises can help overcome these barriers.

5. CONCLUSION

The integration of digital technologies in ecopreneurship businesses not only strengthens financial sustainability but also contributes significantly to environmental sustainability. The **findings** of this study show that by leveraging technologies such as data analytics, artificial intelligence, and the Internet of Things (IoT), ecopreneurs can enhance operational efficiency, reduce environmental impacts, and help accelerate the achievement of sustainable development goals. These technologies enable businesses to optimize resource usage, minimize waste, and support environmental conservation efforts.

The successful application of digital technologies by ecopreneurs can serve as a model for other businesses to create innovative and sustainable ventures in the digital economy era. Digital technologies not only facilitate cost savings and productivity improvements but also provide tools for more effective monitoring and management of environmental impacts. Through digitization, ecopreneurs can expand their reach to broader markets, educate consumers about sustainability, and strengthen their positions in markets that increasingly prioritize eco-friendly principles.

Therefore, the adoption of digital technologies is essential in driving the transformation of industries toward a greener and more sustainable future. Businesses that integrate digital technologies with environmentally friendly practices can achieve financial success while also contributing to the overall improvement of social and environmental conditions. In conclusion, the integration of digital technologies in ecopreneurship presents great potential to create business models that are both profitable and supportive of global sustainability. **Future Research:** While this study offers valuable insights, future research could explore the long-term impact of digital technologies on the sustainability of ecopreneurship businesses. Additionally, it would be beneficial to investigate the challenges faced by ecopreneurs in different regions, as well as the role of policy frameworks and governmental support in fostering the adoption of digital technologies in sustainable business practices.

6. DECLARATIONS

6.1. About Authors

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6.2. Author Contributions

Conceptualization: AD; Methodology: ED; Software: AD; Validation: ED and AD; Formal Analysis: ED; Investigation: AD; Resources: ED; Data Curation: AD; Writing Original Draft Preparation: ED and AD; Writing Review and Editing: ED and AD; Visualization: ED; All authors, AD, and ED, have read and agreed to the published version of the manuscript.

6.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.4. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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