

Advancing Ecopreneurship for Regenerative Outcomes: Evidence from Nigeria

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Abstract

Introduction: In the era of regenerative development, regenerative entrepreneurship has evolved as a feature of contemporary business models, emphasizing ecological restoration and renewal, social resilience, and long-term economic sustainability through innovative and sustainable business activities for net-positive outcomes.

Objectives: This study focused on an analysis of the impact of circular economy principles, systems thinking and sustainable business practices on regenerative outcomes of ecopreneurial firms in Nigeria. It also contrasted the regenerative outcomes of firms that have ecological innovation strategies with conventional innovation strategies, and examined the impact of ethical leadership, community engagement and regenerative performance metrics on regenerative outcomes.

Methods: The study was a quantitative cross sectional survey design with twenty ecopreneurial firms from different sectors in Nigeria selected through purposive sampling technique. Structured questionnaires were employed for data collection. Logistic regression was used to analyze the influence of circular economy principles, systems thinking and sustainable business practices on the likelihood of achieving regenerative outcomes; an independent samples t-test was utilized to compare the regenerative outcomes of ecological innovation and conventional innovation strategies, and the effects of governance and stakeholder drivers on regenerative outcomes were assessed using Structural Equation Modelling (SEM).

Results: The findings showed that the application of circular economy principles ($p = 0.045$, $\text{Exo}[B] = 3.32$) and systems thinking ($p = 0.071$, $\text{Exo}[B] = 2.46$) significantly increased the probability of achieving regenerative outcomes, whilst the greater reliance on conventional sustainability practices lowered the chances of achieving regenerative outcomes ($p = 0.034$, $\text{Exo}[B] = 0.43$). The ecological restoration outcomes were significantly greater when innovation strategies were ecological as compared to conventional ($t = 13.10$, $p < 0.001$). SEM results also revealed that ethical leadership ($\beta = 0.45$, $p < 0.001$), community engagement ($\beta = 0.39$, $p < 0.001$), and regenerative performance metrics ($\beta = 0.52$, $p < 0.001$) all significantly and positively influenced the regenerative outcomes, with the latter being the most influential.

Conclusions: The study shows that the change towards regenerative business is not only a change towards sustainability, but the integration of circular economy principles, systems thinking, ecological innovations, ethical leadership, community engagement and regenerative performance measurement into a coherent ecopreneurial framework. The results contribute to the growing body of literature on regenerative ecopreneurship and offer empirical evidence to guide policy makers, business executives and entrepreneurs in facilitating the shift towards regenerative economies in emerging markets.

Keywords: Ecopreneurship, Regenerative Outcomes, Circular Economy; Systems Thinking; Ecological Innovation; Ethical leadership; Community Engagement;

1. Introduction

The 21st century is unique in that it is characterized with significant, overlapping trends, innovations and transformation. Recent literature emphasizes that the current century has seen globalization and interconnectedness, digital revolution, technological advance, artificial intelligence, space exploration and frontier science, transformation of education and access to knowledge, economic and social transformation and global crisis, such as pandemics, climate change, biodiversity loss, ecological degradation, resource depletion, social and economic inequalities (Geissdoerfer et al., 2020; D'Amato & Korhonen, 2021; Caldera et al., 2022). All these global challenges have made it necessary to shift from the traditional and linear models of growth to inclusive, sustainable, circular and regenerative economic models.

The current trend of the transformational innovation is in relation to the trend of prioritizing environmental and social goals. The notion of ecopreneurship for regenerative future is gaining prominence around the world (D'Amato & Korhonen, 2021). It has become a crucial alternative for systemic change in the fundamental logic of business practices to engage in proactive regeneration. Sustainable design of business enterprises that focuses on doing less harm to regenerative entrepreneurship that centres on restoring, renewing and revitalizing socio-ecological systems is needed for a regenerative future. A regenerative outcome is a progressive and transformative trend that aims to create enterprises that not only minimize negative impacts but actively contributing to the well-being of the environment, society and economy (Hahn & Tampe, 2020; Gibbons, 2020). The foundation of regenerative entrepreneurship hinges on ecopreneurship model that create ventures which integrates environmental and ethical values into core business operations that significantly contribute to customers and environment values (Camrass, 2020, Gibbons, 2020).

Digital transformation, innovation-driven ecosystems, ecopreneurship, sustainability and regeneration are the key features of the "Fourth Age" of entrepreneurship, or "Entrepreneurship 4.0" as it is sometimes called. The transition to a regenerative future of ecopreneurship needs organisations to shift and change to new business models, rethinking and reimagining their value proposition and redesigning

value chains in a way that support a regenerative economy. This is more of a mindset shift from the conventional sustainability concept of minimising harm to actively repairing the loss that has come before it, restoring natural resources and revitalising environmental and social systems (Geissdoerfer et al., 2020). A regenerative economy is a transformative pathway to foster harmony within socio-ecological systems. As a result, the use of regenerative models is gaining growing attention from both academia and industry around the globe (Yadav & Yadav, 2024).

The linear production-consumption models are no longer dominant in the digital age and the green paradigm is no longer sufficient in the era of entrepreneurship. In today's finite resource and growing ecological challenges, these models are outdated. The transition demands a paradigm change towards regenerative entrepreneurship, which aims to do more than just reduce impact, to actively restore natural ecosystems and uplift host communities. Through the sustainable business innovation that is guided by the principles of regeneration, ecopreneurs can create realignment by rethinking their value proposition, reshaping customer relationships, optimizing resource flows and combining different types of capital to strive towards a regenerative future. Ecopreneurs who are successful in using these elements are more likely to be able to provide solutions to systemic environmental and social problems that are scalable, inclusive and regenerative. The regenerative business model dictates that businesses become "agents of healing" in the midst of environmental degradation, social inequality and economic imbalance and that ecological principles, systems thinking and ethical leadership be integrated into their core business (Bocken & Ritala, 2021).

However, the traditional sustainability solutions, which focus on mitigation rather than repair, have come under scrutiny due to the increasing global worries about climate change, biodiversity loss, and resources depletion. Thus, a new paradigm for business known as regenerative ecopreneurship has emerged, which incorporates circular economy ideas, systems thinking, sustainable business methods, ecological innovation strategies, ethical leadership, community engagement and regenerative performance measurement to generate net-positive environmental, social and economic value. Even with this shift, many organisations, especially in emerging

economies, still use traditional methods of business and innovation, which is limiting their ability to deliver ecological restoration, resource circularity and social ecological resilience regenerative outcomes.

Previous research has largely examined circular economy principles, systems thinking, sustainable business practices, ecological innovation strategies, conventional innovation strategies, ethical leadership, community engagement and regenerative performance metrics in isolation as independent drivers without attending to the complementary effects of the interplay of these drivers in the context of regenerative outcomes. Empirical studies on regenerative ecopreneurship are still very limited, especially within the context of emerging economies in Africa region like Nigeria, where quantitative research on how to transform the business in a regenerative manner is limited. Against this background, this study addresses these gaps by examining the integrated influence of these drivers on regenerative outcomes of the ecopreneurial firms in Nigeria. The results of the study will contribute to the existing body of research on regenerative ecopreneurship and offer evidence-based policy recommendations for business and policy makers interested in supporting businesses to transform to a regenerative approach.

2. Research Questions

RQ1: In what way do circular economy principles, systems thinking and sustainable business practices impact the chances of regenerative outcomes in ecopreneurial firms?

RQ2: What are the differences between the regenerative ecological outcomes of ecopreneurial firms using ecological innovation strategies and the other firms using conventional innovation strategies?

RQ3: What is the impact of ethical leadership, community engagement and regenerative performance measures on regenerative outcomes in ecopreneurial firms?

3. Literature

Globally, many firms in different industries and sectors are at the cross road; battling with the challenges of increasing productivity and service offerings, competitive operations, effective use of resources and ecological restoration within the ecosystems. Ecopreneurship for a regenerative future requires sustainable business innovation, for healthier ecosystems and resilient practices. There are

numerous ecological-based restoration companies that are emerging around the world, including Nigeria for a regenerative future. The ways in which the circular economy principles disrupt the take-make-dispose paradigm and promote resource-efficient loops through reusing, remanufacturing and recycling resources is widely discussed throughout the world (Howard et al., 2019). The concepts of maximising the use of resources and minimising wastes, energy consumption and environmental impact are tackling circular economy challenges (Murray et al., 2017). Circular economy is a solution to series of ethological challenges (Lieder, & Rashid, 2016). This niche theme, called ecopreneurship, has been turned into the broad research topic, which indicates paradigm shift from the conventional sustainability principles to the regenerative principles (Santini, 2017). The circular economy business model (CEBM) is a business model that focuses on creating regenerative results by redesigning business processes and shifting towards closed loop systems, where growth is not dependent on resource use (Howard et al., 2019).

Ecopreneurship is about shifting from small, green changes to innovation through ecological value addition. Scholars emphasize that these efforts are related to the circular economy and systems thinking. Circular economy is presented as an innovation that has the potential to disrupt the linear economy of take-make-dispose by closing resource loops through reusing, recycling and reducing waste and it creates ecological balance and local economic resilience (Kirchherr et al., 2017). Geissdoerfer et al. (2017) and Geissdoerfer et al. (2020) consider circular economy as a new paradigm for sustainability, which focuses on restorative flows. This model is based on ecological resilience and local socio-economic renewal (Murray et al. 2017; Korhonen et al. 2018). According to Ellen MacArthur Foundation's study (2013), the circular economy is a system designing out waste and enabling circular value creation. Systems Thinking helps by providing a holistic perspective and understanding the interdependencies between socioeconomic and environmental systems when actualizing the potentials of a circular economy. Bocken et al. (2016), Camacho-Otero et al. (2018) and Kalmykova et al. (2018) present empirical studies which demonstrate that combinations of the circular economy with systems thinking lead to more regenerative and resilient business models.

As the present global economic development model revolves around linear flows of materials and energy, it generates waste, depletes natural resources, leads to emission and transforms natural landscapes, resulting in a complex web of environmental degradation, social and economic issues (Geissdoerfer et al., 2017; Korhonen, 2018). Replacing linear economic model with a circular economy model is meant to facilitate regenerative economy (Reike et al., 2018). Regenerative models are not just about harm minimisation, but about active restoration, renewal, enrichment and revitalisation of ecological and social systems. On the other hand, linear sustainability strategies are based on efficiency and compliance, and do not take into account net positive results (Sustainability Directory, 2025). Businesses that follow a circular economy and integrate systems thinking into their business models generally show strong regenerative results, whereas companies with traditional sustainability approaches do not.

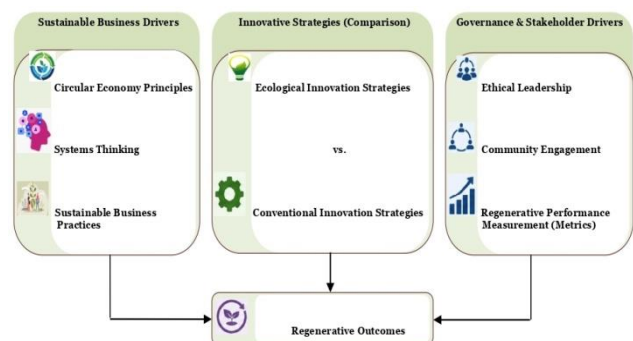
Ecopreneurship is closely related to eco-innovation that is eco-friendly, green practice, ecological sustainability, novel product or service processes due to ecological challenges instead of cost reduction (Rodríguez-García et al., 2019). A research study by Hultman et al. (2016) highlight three cardinal pillars of ecopreneurship to include innovation, environmental friendliness and long-term sustainability. The global shift to a regenerative economy, has increased the pressure on organisations to fundamentally shift away from traditional innovation approaches and towards ecological innovation approaches that are designed to support ecological restoration and sustainability in the long-term. The innovation strategy is now a key factor in organizational competitiveness and sustainability.

A new line of research has emerged in the ecological restoration, renewal and revitalization of socio-ecological systems in the literature on entrepreneurship which seems to be a pressing line of research. The green companies with a future oriented vision on ecological restoration have the aim of taking care of and recovering the ecosystems from the negative impacts caused by the implementation of their economic activities (Rekik & Bergeron, 2017). Ecopreneurial projects based on eco-innovations such as precision restoration are more sensitive to a higher ecological restoration impact than projects using traditional green-business approaches. What sets ecological innovations apart from those that are

incremental in the context of a green business is that they are based on multi-stakeholder and community-based models that multiply the impact of the ecological innovation through the co-creation of a solution, shared learning and collective action (De Dentoni et al., 2021; Schubert, et al., 2022).

Recent research framework identify cross-scale circulatory systems, integrated organizational structures, relationship-based value systems and collective learning frameworks as interdependent key elements of a regenerative economy (Rodríguez-García, 2019; Geissdoerfer et al., 2020; Lindgreen et al., 2020; Yadav & Yadv, 2024; Gre Purushothaman, 2025). However, this study proposes a conceptual framework that integrates the constructs or variables of the study underlying ecopreneurship and regenerative outcomes. The framework provides direction for examining the hypothesized relationship among the study variables. Figure 1 presents the proposed conceptual framework of the study.

Figure 1: Conceptual Framework



Source: Authors' Conceptualization (2026).

Figure 1 shows how sustainable business drivers (circular economy principles, systems thinking and sustainable business practices); innovation strategies (ecological innovation and conventional innovation); governance and stakeholder drivers (ethical leadership, community engagement and regenerative performance metrics) influence regenerative outcomes. The principles of circular economy, systems thinking and sustainable business practices have therefore become key components in the development of regenerative ecopreneurship and business transformation (Geissdoerfer et al., 2017; Konietzko et al., 2020; Hahn & Tampe, 2021).

The circular economy principles aim to account for resource efficiency, waste minimisation, prolonging the life-cycle of products, recycling and natural capital regeneration, in order to shift the production model

from linear to restorative system (Kirchherr et al. 2017; Ellen MacArthur Foundation, 2019; Cerchione et al. 2026). There are empirical findings that prove circular business models are more successful in improving environmental or ecological performance, innovation, competitiveness and long-term value creation (Bocken et al., 2016; Centobelli et al., 2020).

Systems thinking is a companion to circularity that helps companies to grasp the interlinkages between the environmental, the economic and the social systems. It facilitates comprehensive decision-making, organization adaptability and a response to complex sustainability issues (Meadows, 2008; Arnold & Wade, 2015; Mella, 2015). In the same vein, sustainable business practices incorporate principles of environmental care, responsible management, stakeholder engagement and resource efficiency throughout the strategy and work of companies. These practices increase environmental performance, value for the stakeholders and long-term competitiveness and help to move from sustainability to regenerative value creation (Dyllick & Muff, 2016; Lozano, 2018).

These drivers work together to create the strategic bedrock for regenerative business models, which include ecological restoration, organizational resilience and sustainable value creation (Geissdoerfer et al., 2017; Konietzko et al., 2020). The shift from sustainability to regenerative development has resulted in the focus of scholarly research being shifted to business models that create environmental, social and economic value.

The modern discourse of sustainability is considering two types of innovation strategies, both of which focus on distinct sustainability-related aspects. Conventional innovation strategies are mainly oriented towards economic performances and operational efficiency, while ecological innovation strategies incorporate the environmental dimension into product, process, organizational and business model innovation in order to achieve long-term regenerative results (OECD, 2011; Rennings, 2000).

Ecological innovation (eco-innovation) indicates the creation and application of products, processes, technologies and managerial innovations which minimize environmental impacts, while maximizing resource efficiency and generate economic value (Rennings, 2000). Conventional innovation aims to achieve innovation through clean production, use of

renewable resources, reduction of wastes, circular resource flows and low carbon technologies, whereas ecological innovation aims to restore nature (Kemp & Pearson, 2007; OECD, 2011).

Previous studies have shown that companies that implement ecological innovation better environmental performance and organizational resilience, competitive advantage, and long-term sustainability (Diaz-Garcia et al., 2015; Cainelli et al., 2020). Conventional approaches to innovation, on the other hand, are more focused on productivity, profitability, markets, and technology, and environmental issues are viewed as a secondary goal. While these strategies are helpful in raising productivity and creating efficiency in the operation, they are often seen as part of linear production systems and thus are not very supportive for ecological restoration and regenerative development (Porter & van der Linde, 1995; Geissdoerfer et al., 2017).

Ecopreneurship puts ecological innovation at the heart of the business decision-making process and value creation, as a strategic tool, to support the implementation of regenerative business models. Ecopreneurial companies that are moving towards ecological innovation are more likely to increase both the contribution to the conservation of biodiversity and the regeneration of resources, circularity of resources and long-term ecological resilience and create economic and social value (Schaltegger & Wagner, 2011; Konietzko et al., 2020). While ecological innovation has gained considerable traction in the sustainable business literature, most research is limited to the impact of ecological innovation on environmental sustainability and firm competitiveness, and has not been explored for its impact on regenerative outcomes.

Governance systems are needed that support sustainable to regenerative business models, which incorporate ethical considerations in the decision making processes, align stakeholders, and assess performance beyond financial measures. In this context, ethical leadership, community engagement and regenerative performance measurement have become important governance and stakeholder enablers of regenerative ecopreneurship (Hahn & Tampe, 2021; Dyllick & Muff, 2016).

Ethical leadership, based on fundamental values and an awareness of responsibility, is a crucial factor in the creation of models of ethical governance and

regenerative organizational practices. Ethical leadership fosters integrity, accountability, environmental responsibility and decision making based on the interests of stakeholders. Leaders who integrate ethical values into their organizational strategy promote responsible use of resources, innovation in sustainability, and value creation over the long-term and foster trust among their employees, customers and communities (Brown et al., 2005; Maak & Pless 2006). Within the context of ecopreneurial companies, ethical leadership contributes to the needs of regenerative practice by harmonizing economic goals with ecological restoration and social welfare.

Likewise, community involvement involves acknowledging the local communities as value creation and environmental stewardship partners. Community engagement moves from participatory restoration, to co-creation, with the goal of improving ecological stewardship and environmental outcomes that will last for years to come. When stakeholders are engaged and can contribute their own ideas, knowledge is shared, social legitimacy is established, resources are mobilized and collaborative problem solving takes place, this increases the strength of ecological restoration efforts and builds organizational resilience (Reed, 2008). Community engagement is a means to co-creating solutions with community that create shared environmental, social and economic value in regenerative business.

In addition to leadership and stakeholder engagement, regenerative performance measurement takes an organization's assessment beyond financial and sustainability metrics to include ecological restoration, biodiversity enhancement, circular resource use, social well-being and long-term system resilience (Fullerton, 2015; Sessa, 2025). Regenerative metrics are not just about profitability or operational efficiency, but are about system-wide indicators. These metrics allow organizations to track regenerative value creation and make strategic decisions to help achieve positive environmental and societal outcomes.

Together, the governance components of ethical leadership, community engagement, and regenerative performance measurement offer a holistic approach to governance that can help ecopreneurial firms achieve positive regenerative results by working with stakeholders and holding themselves accountable for their actions through evidence-based decision making. The multi-dimensional and integrated approach is

more likely to produce durable and comprehensive regenerative effects, especially in ecopreneurial contexts, when coupled with ethical leadership and active community engagement.

Ecological restoration, resource circularity and social-ecological resilience regenerative outcomes go beyond sustainability and focus on restoring and renewing ecological and social systems, instead of only minimizing environmental harms. Regenerative business models are conceived as a way of generating net positive environmental, economic, and social value by adopting practices that restore ecosystems, regenerate natural capital, and increase community resilience (Fullerton, 2015; Hahn & Tampe, 2021). Accordingly, ecological restoration, resource circularity and social-ecological resilience are identified as key signs of performance of an ecopreneurial company's performance in terms of its restorative capabilities.

Ecological restoration uses environmentally responsible business practice to restore and enhance ecosystem functions, biodiversity and natural resources. Ecopreneurial companies can help with ecological restoration efforts by using low-carbon technologies, lowering pollution, protecting biodiversity and by implementing natural-based solution (NbS) that can help to improve the health of the ecosystems (Society for Ecological Restoration [SER], 2026; Gann et al., 2019). These restorative practices are different from the approach to sustainability that is primarily about reducing impact and are a hallmark of regenerative businesses.

Resource circularity measures the ability of companies to keep the value of materials and resources by reusing, recycling, remanufacturing and closed-loop systems. Resource circularity aims to achieve minimal waste generation, resource efficiency and dependence on virgin raw materials, and is grounded in principles of circular economy to support long-term environmental sustainability and value creation from a regenerative perspective (Kirchherr et al., 2017; Ellen MacArthur Foundation, 2019). The ability of an organisation, a community and an ecosystem to adjust, rebound, and grow following environmental and socio-economic stress is called social-ecological resilience. Ecopreneurship builds resilience by teaming up with stakeholders, adapting governance, innovating and managing resources responsibly, while creating long-term environmental and social values for

companies to act on sustainability issues (Folke et al., 2010; Biggs et al., 2015).

Ecological restoration, resource circularity and social-ecological resilience offer a holistic approach to assess regenerative outcomes. These dimensions reflect the potential for ecopreneurial firms to go beyond mere environmental compliance to develop positive and sustainable outcomes for ecosystems, communities and future generations.

An appraisal of the systematic literature review (1995-2026) on this subject clearly shows that in the emerging economies in Africa region, studies on sustainable business drivers with reference to circular economy principles, systems thinking and sustainable business practices were done in isolation or independently. There is little empirical evidence on the effectiveness of ecological innovation strategies compared to the conventional innovation strategies in achieving regenerative ecological outcomes. While separate studies have explored ethical leadership, stakeholder engagement and sustainability performance, there is a lack of empirical literature focusing on how these three factors interact to create regenerative outcomes in ecopreneurial firms. Existing research has focused on the environmental sustainability and circular economy performance of regenerative business but neglected to consider regenerative outcomes as a multi-dimensional concept that includes ecological restoration, resource circularity and social-ecological resilience.

Based on the foregoing discussion, we hypothesize that

H1: The principles of circular economy, systems thinking and sustainable business practices are significant predictors of high regenerative outcomes for ecopreneurial firms.

H₂: Ecopreneurial firms with ecological innovation strategies outperform those with conventional innovation strategies in terms of ecological outcomes of their innovation.

H₃: Ethical leadership, community engagement, and regenerative performance metrics have a strong impact on regenerative outcomes.

4. Methods

The present study is of multiple case study design and uses mixed method approach; both qualitative and

quantitative are applied in order to carry a thorough investigation of the problem under study both on the theoretical and empirical level. The target population includes Ecopreneurial firms in Nigeria, as well as conventional sustainability practices across different sectors such as agriculture, renewable energy, waste management and recycling, hospitality and tourism, construction and architecture, oil and gas, manufacturing, technology and innovation, real estate and telecommunication. Using purposive sampling technique, twenty ecopreneurial firms, which incorporate ecological perspective and traditional sustainability practices in their operations were chosen. In order to obtain the dataset required, the study used a combination of semi-structured interviews with founders and sustainability officers to gain in-depth qualitative insights, structured questionnaires to collect quantifiable data on the state of the application of circular economy principles, systems thinking, sustainability practices, ecological and conventional strategies, ethical leadership, and community engagement, and document analysis to validate the claims of the interviewees and to uncover patterns in ecological practice. Several types of statistics were used to analyze the data as needed for the various hypotheses. Twenty ecopreneurial firms were surveyed for Hypothesis 1, on five selected variables that affect regenerative outcomes, the practice of circular economy principles, systems thinking, sustainability practices and firm age. These companies were grouped in ten diverse groups, each group consisting of two companies with similar characteristics in terms of types of activity. The grouping resulted in datasets that were analysed with logistic regression. The analysis for hypothesis 2 used 20 firms, which were split into two groups of 10 firms each: one with firms using ecological innovation strategies and the other with firms using conventional strategies. This structure yielded 20 datasets and those data were analyzed by independent samples t-test. For Hypothesis 3, data pertaining to ethical leadership, community engagement, regenerative metrics and regenerative outcomes were collected from the sampled ecopreneurial firms. These variables were examined using structural equation model (SEM) to assess causal relationships among them.

5. Results

H₁: The principles of circular economy, systems thinking and sustainable business practices are significant predictors of high regenerative outcomes for ecopreneurial firms.

Logistic Regression

Variable name	Type	Description
Regen_outcome	Binary (0/1)	Dependent variable: 1 = Regenerative 0 = Not regenerative
Circ_econ_score	Continuous (0-10)	Degree of circular economy integration
Systems_thinking_score	Continuous (0-10)	Extent of systems thinking practices
Sust_practice_score	Continuous (0-10)	Reliance on conventional sustainability practice
Firm_age	Continuous (years)	Years of the ecopreneurial venture
Sector	Categorical	Types of activity (agriculture, renewable energy, waste management and recycling, hospitality and tourism, construction and architecture, oil and gas, manufacturing, technology and innovation, telecommunication and real estate).

Regen_outcome	Cir-econ_score	Systems_thinking_score	Sust_practices_score	Firm_age_years	Sector
1	9.0	8.5	3.0	>20	Agriculture
0	4.0	3.5	8.0	>5<10	Renewable energy
1	8.0	7.5	4.0	>15<20	Waste management/ recycling
0	3.5	2.5	9.0	>15<20	Hospitality & tourism
1	9.5	9.0	2.0	>5<1	Construction/ architecture
0	5.0	4.5	7.0	>20	Oil & gas
1	8.5	8.0	3.5	>20	Manufacturing
0	4.5	3.0	8.5	<5	Technology & innovation
1	9.0	8.0	3.0	>20	Telecommunication
0	3.0	2.5	9.5	>15<20	Real estate

Hypothetical Output

Variable	Coefficient	Std. error	z-value	p-value	Odd ratio (Exp[B])
Intercept	-8.50	4.30	-1.98	0.048	-
Cir_econ_score	1.20	0.60	2.00	0.045	3.32
Systems_thinking_score	0.90	0.50	1.80	0.071	2.46
Sust_practice_score	0.85	0.40	-2.13	0.034	0.43
Firm_age	0.10	0.25	0.40	0.685	1.11

Based on the hypothetical output in the table, the circular economy score ($p = 0.045$, $\text{Exo}[B] = 3.32$) is a significant positive score. It signifies each unit increase in circular economy integration increases the odds of a

regenerative outcome by over three times. Systems thinking score ($p = 0.071$, $\text{Exo}[B] = 2.46$) is significant positive and it suggests that, greater systems thinking has more than double the effect on regenerative

outcome. For the sustainability practices score ($p = 0.034$ $\text{Exo}[B] = 0.43$), it depicts significant negative predictor, which means that greater reliance on conventional sustainability practice decreases the odds of a regenerative outcome, while for the firm age; the result shows that there is no significant

predictor. This finding indicates that age of venture itself does not impact the regenerative orientation. Hence the logistic regression confirms hypothesis 1, that circular economy and systems thinking are positively correlated with regenerative outcome and sustainability practices are negatively correlated.

H₂: Ecopreneurial firms with ecological innovation strategies outperform those with conventional innovation strategies in terms of ecological outcomes of their innovation.

Independent Sample t-test Analysis

Variable	Type	Description
Innovation_type	Categorical	1 = Ecological innovation strategies 0 = Conventional innovation strategies
Restoration_score	Continuous (0-100)	Ecological restoration impact

'Innovation_type': [1]*10 + [0]*10

'Ecological_innovation_strategies': [85, 88, 90, 83, 86, 87, 89, 84, 91, 86]

Conventional_innovation_strategies': [72, 69, 75, 70, 74, 68, 73, 71, 67, 70]

Group 1: Ecological innovation strategies (n = 10: 85, 88, 90, 83, 86, 87, 89, 84, 91, 86)

Group 0: Conventional innovation strategies (n = 10: 72, 69, 75, 70, 74, 68, 73, 71, 67, 70)

Independent Sample t-test Results

Group	N	Mean score (Restoration)	Std. deviation	t-statistic	p-value	Interpretation
Ecological innovation strategies (Group 1)	10	86.9	2.60	13.10	<0.0001	Significant with high restoration impact
Conventional innovation strategies (Group 0)	10	70.9	2.60			Significant with low restoration impact

The results of the test above indicate that there is a statistically significant difference between the two groups. A t-statistic of 13.10 indicates that there is a significant difference between the group means at a p-value < 0.001. Ecopreneurial firms engaging ecological

innovation strategies achieve substantially greater ecological restoration outcomes compared to those using conventional strategies, thus supporting hypothesis 2 of the study.

H₃: Ethical leadership, community engagement and regenerative performance metrics have a strong impact on regenerative outcomes.

Structural Equation Model (SEM)

Latent Variables	Observed indicators
Ethical Leadership	EL ₁ = Transparent decision-making EL ₂ = Value-based vision EL ₃ = Integrity in operations
Community Engagement	CE ₁ = Community partnership efforts CE ₂ = Stakeholder inclusion

Regenerative Metrics

Regenerative Outcome

RO = EL + CE + RM

RO = β_1 EL + β_2 CE + β_3 RM + ε

RO = Regenerative Outcome

EL = Ethical Leadership

CE = Community Engagement

RM = Regenerative Performance Measurement (Metrics)

β_1 - β_3 = Structural Path Coefficient

ε = Structural Error Term

CE₃ = Social capital investment

RM₁ = Use of ecological performance metrics

RM₂ = Long-term impact tracking

RM₃ = Systems feedback integration

RO₁ = Ecological restoration impact

RO₂ = Resource circularity level

RO₃ = Social ecological resilience score

Hypothetical Estimation Results

Parameter	Estimate(β)	Std. error	z-value	p-value
EL ₁	0.77	0.05	15.4	<.001
EL ₂	0.82	0.04	20.5	<.001
EL ₃	0.75	0.05	15.0	<.001
CE ₁	0.79	0.05	15.8	<.001
CE ₂	0.85	0.04	21.3	<.001
CE ₃	0.77	0.05	15.4	<.001
RM ₁	0.83	0.04	20.8	<.001
RM ₂	0.88	0.03	25.3	<.001
RM ₃	0.80	0.05	16.0	<.001
RO ₁	0.78	0.05	15.6	<.001
RO ₂	0.82	0.04	20.2	<.001
RO ₃	0.76	0.05	15.2	<.001

Structural Paths

RO ~ EL	0.45	0.11	4.09	<.001
RO ~ CE	0.39	0.10	3.90	<.001
RO ~ RM	0.52	0.12	4.33	<.001

Given the data in the table, it is safe to say that ethical leadership ($\beta = 0.45$, $p < .001$) has a significant and positive effect and thus, that ethical governance leads to regenerative results. Likewise, community engagement ($\beta = 0.39$, $p < .001$) suggests that a sense of community is a significant positive factor of regenerative outcomes. In addition, regenerative metrics ($\beta = 0.52$, $p < .001$) prove to be a good predictor of regenerative outcomes. These results suggest that collectively, ethical leadership and community engagement and regenerative metrics have a significant and positive influence on achieving

regenerative outcomes in ecopreneurial ventures. These findings support hypothesis 3.

Discussion

The first hypothesis (H_1) was to examine if circular economy integration, systems thinking, sustainable business practices predict regenerative outcomes. The analysis provided very strong results. The circular economy score turned to be a very important positive predictor ($p = 0.045$; $\text{Exp}[\beta] = 3.32$), which means that the probability of regenerative outcomes was more than three times bigger with a one-unit increase in the circular economy integration score. This discovery highlights the potential of circular economy principles,

such as closed-loop systems, material reuse and design for longevity, which are important for systemic ecological regeneration.

Likewise, there was a positive relationship between systems thinking and regenerative outcomes ($p = 0.071$; $\text{Exp}[\beta] = 2.46$), indicating that ecopreneurial ventures using systems-based approaches, in which one thing is connected to another, in which there are feedback loops, and in which there is a holistic design, are more than 2 times more likely to produce regenerative outcomes. The p value is just above the standard 5% significance level, but the odds ratio is very strong and the theoretical fit is appropriate, which means that the p value is considered to be significant.

The score for sustainability practices, on the other hand, proved to be a significant negative predictor ($p = 0.034$; $\text{Exp}[\beta] = 0.43$). This inverse relationship suggests that companies which have adopted traditional or conventional, efficiency-focused sustainability strategies, typically incremental in nature, are less likely to be able to deliver regenerative results. This is in keeping with criticisms that conventional sustainability approaches often focus on doing "less harm" instead of "restoring and renewing" as is the hallmark of regenerative approaches. Interestingly, firm age did not result as a significant predictor, which means that the orientation of the firm toward regenerative outcomes is not dependent on how long they have been in operation. This implies that the ability of a company to regenerate less depends on its maturity than on strategic will and innovativeness.

These findings support Hypothesis 1, indicating that the incorporation of circular economy principles and systems thinking has a positive correlation with regenerative outcomes, and that the use of sustainability practices have a negative correlation to achieving a regenerative outcome. The findings align with the research results that linear economy model can be substituted with the idea of circular economy which promotes regenerative economy (Reike, 2018); incorporation of the circular economy idea with systems thinking leads to more regenerative and resilient business models (Bocken et al., 2016; Camacho et al., 2018; Kalmyova et al., 2018); linear approach to sustainability does not lead to net positive outcomes (Sustainability Directory, 2025).

The second hypothesis (H_2) considered the statistical significance of the difference between the ecological restoration results for ecopreneurial firms using ecological innovation strategies and for those using conventional strategies. The results of the analysis showed that there was a highly significant difference between the two groups ($p < 0.001$), with a t -statistic of 13.10 representing a large effect size. Companies that embraced ecological innovations, like precision restoration, closed-loop design and nature-based solutions, experienced significantly greater restoration results than others who did not. This outcome gives strong empirical support to Hypothesis 2, and strengthens the claim that ecological innovation through regeneration is a better road to environmental recovery and resilience. Therefore, these findings support the conclusions of the research that firms with a green orientation towards the future can contribute to ecological restoration (Rekik & Bergeron, 2017) and ecological innovation firms have higher ecological restoration impact than conventional innovation firms (Pichlak & Szromek, 2021).

The third hypothesis (H_3) investigated the influence of ethical leadership, community engagement and regenerative metrics in influencing regenerative outcomes. These three predictors were all significant in the regression analysis. A strong positive influence was found for ethical leadership ($\beta = 0.45$, $p < .001$), underscoring the importance of values-based governance to guide regenerative decision making and build a culture of ecological responsibility. Community engagement also was a major factor ($\beta = 0.39$, $p < .001$), indicating that co-created, co-learning models could create more impact on ecological outcomes through shared stewardship and collective agency. Overall, it is interesting to note that the strongest predictive power was for the regenerative metrics ($\beta = 0.52$, $p < .001$), which highlights the necessity to prioritize system-wide indicators of performance (such as biodiversity gains, circular material flows and ecosystem health) over traditional financial indicators. These results support Hypothesis 3, confirming the importance of ethical leadership, coengagement with the community and advanced systems of regenerative measurement in ecopreneurial ventures. These findings are in agreement with the empirical findings of De De Dentoni et al. (2021), Schubert, et al. (2022) that multi-stakeholder and community-based models of regenerative economy are essential elements for ecosystem restoration and renewal.

7. Conclusions and Recommendations

This study has contributed to the discourse in the field of sustainable business innovation in ecopreneurship related to a regenerative future. The empirical findings from the study give a solid basis for a framework of a regenerative business. The research reaffirms that a shift from traditional sustainability approaches is needed for the transition of ecopreneurship towards a regenerative future. It insists that the implementation of the circular economy design, systems thinking, ecological innovation strategies, ethical leadership, community and use of regenerative metrics are the basic enablers of sustainable business innovation for a regenerative future. The study has a number of implications for those who are involved in the research, practice and policy of building resilient and regenerative economy. The following recommendations are put forward.

1. Policy makers should promote the adoption of circular economy principles for ecological restoration and healthy environment through supportive regulatory frameworks, green financing and fiscal incentives, while business incubators should encourage resource efficiency, waste valorization and adoption of circular business models.
2. Government and investors should shift focus from traditional sustainability models that reduce harms to ecosystem restoration and long-term value creation by integrating regenerative principles into entrepreneurship curricula and enterprise support programmes.
3. Business organizations should strengthen regenerative outcomes and organizational resilience by embedding systems thinking, ethical leadership, community collaboration and regenerative metrics into strategic planning and corporate governance.
4. Public and private stakeholders should incorporate sustainability and regeneration principles into entrepreneurial ecosystems and foster cross-sector partnerships that support ecological innovation, inclusive stakeholders' participation and local value chains for long-term ecological restoration and regenerative development.

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