

Eco-Innovation, A New Business Profitability Strategy for Environmental Sustainability

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Abstract

This paper presents an empirical investigation into an emerging field of study which seeks to ascertain the nature of relationship or influence of eco-innovation on environmental sustainability, business profitability and viability. The failure of market-based tools and government command and control systems to prevent harmful environmental externalities and the undervaluation of natural resources due to the actions of profit-driven entrepreneurs leading to overexploitation and depletion as well as climate change make this study necessary and in high demand. This study adopted the descriptive survey design which allows for the collection of original data from the respondents of selected firms. The study discovered that eco-innovation significantly and favorably influences the profitability and viability of businesses studied and also has a positive and significant influence on environmental sustainability. The study also concludes that organizational practices of eco-innovation have led to high degree of customer's loyalty to firm's product and sustainability of the environment. The study concludes that Eco-innovation generates new technologies in product manufacturing and redesigns through eco-innovation practices and principles. The study also concludes by revealing that Eco-innovation generates new ideas and process that's positively associated with customer's satisfaction.

Keywords: *Eco-innovation, Profitability, Environmental Sustainability, Business viability, Business Strategy*

Introduction

The world with regards to environmental sustainability is in urgent need for eco-innovation because the globe can no longer sustain the amount of natural resources that mankind utilizes today. According to Steffen, Broadgate, Deutsch, Gaffney, and Ludwig (2015), the earth's bio-capacity which includes the extraction and absorption capacity for waste and emissions has already been surpassed by around 50%. The "Earth Overshoot Day" of 2015 happened on August 13, which indicates that in just 8 months, humanity had used up all of the natural resources for a full year. According to scientific calculations, "Earth Overshooting Day" fell on August 2nd, 2017, indicating that humanity has used more ecological resources and services than nature can replenish for us through overharvesting the forests, overfishing, and emitting more CO₂ emissions than the plants can absorb, moving the date by 11 days and demonstrating that it is possible to reduce the human impact on the environment. The population of the planet has increased dramatically since 1950, as have all societal and economic activities. A dashboard of 24 indicators, created by the Stockholm Resilience Center and

International Geosphere-Biosphere Programme (2022), shows how human activity has dramatically increased and how it has affected the Earth system over the past 200 years. In a single human lifetime, trends have accelerated synchronously from the 1950s to the present with little prospect of slowing down. The Great Acceleration refers to these patterns. Strong evidence that the Earth system has changed states may be found in 12 socioeconomic and 12 Earth system patterns from 1750 to the present. The development of major economies throughout the world led to increasing income, a greater desire for purchase, and changes in consumer behavior. The two sets of data are therefore linked, and it is obvious that the development of socioeconomic trends has an impact on the earth indicators. Changes in the Earth's natural systems, such as climate (greenhouse gas levels, global temperature), ocean acidification, terrestrial biosphere degradation, and fish capture, reflect changes in human production and consumption, as measured by GDP, direct foreign investment, energy consumption, transportation, paper or fertilizer use, etc. (Steffen, Broadgate, Deutsch, Gaffney & Ludwig, 2015). More research in recent years have shown how human and economic activity have an unparalleled influence. According to the Millennium Ecosystem Assessment Synthesis Report, 60% of the benefits provided by global ecosystems to support life on Earth (such as fresh water, clean air, and a reasonably stable climate) are being degraded or used in an unsustainable manner. Economic development is said to come at a price of unprecedented material consumption and impact pollution. Maintaining the status quo may have unheard-of effects on the environment, the economy, and wellbeing. Recent sustainability issues (climate change, resource depletion, environmental degradation, and worker welfare) are motivating businesses to modify how they do business. Companies won't be able to adapt to problems like growing resource costs, disruptions in the supply of their raw materials, or legislative changes if they continue with business as usual. Furthermore, the OECD has previously assessed that inactivity has a high cost to the economy, society, and the environment, whereas using tried-and-true improvement strategies is predicted to have a 3 trillion USD economic gain (McKinsey, 2011). As a result, there is an increasing need to identify alternative strategies that may address the sustainability of organizations and goods while also providing potential for development, cost reduction, and competitive advantage (Deutsch, Gaffney, Broadgate, Steffen, & Luthier, 2015). From this vantage point, it is commonly accepted that innovation is a driver of corporate success and competitive advantage at the company level, as well as a driver of economic and social advancement in any country. By encouraging technologies that are solving the present and future environmental concerns, reducing energy and resource use, and fostering sustained economic activity, we may move toward a more environmentally sound and affluent society. Eco-innovation is the term used to describe this kind of innovation.

The main objective of this study is to investigate and ascertain the nature of relationship or effect of eco-innovation on environmental sustainability, business profitability and viability.

Review of related Literature

2.0 Conceptual Review of Eco - Innovation

Eco-innovation is the creation and implementation of a business model that integrates sustainability into all company activities, based on life cycle thinking and in collaboration with partners from all points along the value chain in order to improve a company's performance and competitiveness, it involves a coordinated set of changes or creative solutions to its products (goods and services), processes, marketing strategy, and organizational structure (UNEP 2019). Eco-innovation is also the term used to describe practices that increase resource efficiency and divorce economic progress from environmental degradation or deterioration which ensures that over the course of a product's life cycle, it attempts to do more and better with less resources (Chukwuka 2018). Eco-innovation is fundamentally about lessening the reliance on resources in goods and services while also developing new business models that are competitive, considerate of the environment, and profitable across the whole value chain (Chukwuka & Eboh 2018). Scholars have characterized eco-innovation

with a range of restrictions and degrees of potential. For instance, the OECD (2009) defines eco-innovation as "any innovation that would result in reduced environmental impact, even if such an outcome was not initially intended." While this definition is practical, it portrays eco-innovation as more of a byproduct and downplays its viability as a substitute for business as usual. Europeia (2007) defines eco-innovation as "any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of natural resources, including energy" on the other hand, highlighting its environmental output as the primary goal. There are numerous prospects for eco-innovation, from zero-waste cities, smart infrastructures, or better managing ecosystems and lifestyles, to low-carbon solutions for diverse economic sectors, green goods, and green business models (Doranova, Miedzinski, and Van der Veen 2012). A variety of instances of eco-innovation that has been effectively implemented, focusing on companies, processes or goods (e.g., Xerox managed print services), organizations and marketing tactics (e.g., Vélib bike sharing in Paris), or institutions. These instances demonstrate unequivocally that what is good for the environment is also good for business, and they serve as an example for other businesses and organizations to adopt environmentally friendly practices. Eco-innovation relies on a variety of methods, including changes to processes or straightforward product modifications, as well as the redesign of goods using ecological principles, the use of substitutes, and the development of new business and marketing models. The amount of intervention is heavily influenced by the firms' awareness, resources, and dedication, as well as their strategy (OECD,2009)

Rennings (2000), cited in Chukwuka (2018) suggests that the distinctive feature of eco-innovation as compared to innovation in general is a concern about the direction and content of progress. In particular there have been concerns about whether innovation leads to the mitigation or resolution of an environmental problem. The "Innovation Impacts of Environmental Policy Instruments" - project introduced the term environmental innovation and defined it very broadly: "Eco-innovations are all measures of relevant actors (firms, politicians, unions, associations, churches, private households) which; develop new processes, products, behaviour and ideas, introduce or apply them, and which contribute to reducing the environmental burdens or to ecologically specified sustainability targets".

Eco-innovation can result in changes or creative answers to a business's products, services, operations, marketing strategy, and organizational design. Enhancing a company's performance and competitiveness is the final consequence of eco-innovation. However, these actions take occur within the context of the company's long-term strategic push towards fundamental change. Actual transformation is likely to be achieved by applying the aspects of the new strategy on a steady, progressive, and targeted basis. Businesses add value for the company, the environment, and society at large by adopting eco-innovation (UNEP 2020).

Geissdoerfer et al. (2018) argue that through targeted interventions to enhance processes and products, eco-innovation will frequently build on past efforts made by a corporation to become more sustainable. Many of these initiatives have centered on improving the resource and energy efficiency of the company's operations or end products utilizing techniques like RECP (Resource Efficiency and Cleaner Production). The goal of becoming sustainable throughout the life cycle can be made into a core component of a company's business strategy and mainstreamed into all of its operations through its business models, but this alone won't help a company achieve true sustainability. Eco-innovation is a component of a larger movement that aims to get companies to embrace new, more sustainable business models (SBMs), which are frameworks for bringing about systemic change in favor of sustainability in organizations. These endeavors all have things in common. They put sustainability (in its environmental, social, and economic components) at the center of a company's strategy. They necessitate proactive interaction between the business and all of its stakeholders (including the environment and society as a whole) through a controlled process in order to pinpoint areas of sustainability

that might use improvement. With these upgrades, they want to build long-term value for the network of stakeholders along the value chain (Geissdoerfer et al 2018).

2.1 Importance of Eco-innovation to Business

When attempting to make your company more sustainable, it's natural to concentrate on the effects of your own operations. However, what you do can also have an influence on your suppliers or clients, either positively or negatively. Eco-innovation is a method that enables you to create and diversify sustainable business models that lessen your negative social and environmental effects as well as those throughout your value chain, enhancing your competitiveness and resilience. By embracing three criteria, eco-innovation enables you to assess the total sustainability of the value chain of your company: Eco-innovation may aid SMEs in gaining access to developing markets, increasing productivity, luring new capital into the company, boosting profitability throughout the value chain, and staying ahead of rules and standards (UNEP 2020).

2.2 The implementation of eco-innovation must begin with a change in the business strategy

The incorporation of sustainability into the company's business strategy must be a deliberate choice. Once the choice has been taken to begin the arduous process of implementing sustainability, this plan must trickle down from the strategic level into the business model (UNEP 2019). Changes at the operational level (including the company's goods, customer segments, channels, and customer connections, revenue streams, manufacturing processes, important activities, partners, and cost structure) are then made possible by changes at the business model level. Therefore, eco-innovation is essentially a "top-down" process that starts with a shift in corporate strategy (Geissdoerfer et al 2018).

2.3 Eco-innovation requires a holistic approach

Eco-innovation must be comprehensive in its consideration of every stage of the product life cycle, from the extraction of raw materials through the disposal of waste at the end of its useful life. This will ensure that time and energy spent on eco-innovation contributes to making significant progress against the main threats faced by the industry and does not simply transfer issues from one value chain partner, phase of the life cycle, or problem category to another (UNEP 2014).

2.4 Eco-innovation requires co-operation across the value chain

The complete series of actions or parties that deliver or receive value in the form of goods or services is referred to as the "value chain" (ISO14001:2015). Examples of these parties or activities include suppliers, contractors, investors, R&D, customers, consumers, and members. A corporation that wishes to adopt the life cycle viewpoint previously stated must also take into account the other players in the value chain as the value chain runs concurrently with the life cycle of the product. By enabling action to be made in the portions of the value chain that have the most influence on sustainability challenges, collaboration with other key players in the value chain can assist to optimize the impact of a company's eco-innovation initiatives (UNEP 2014).

If working alone, it could be challenging to gain access to, comprehend, and act in these crucial parts of the value chain. A key aspect of the difficulty of eco-innovation is launching these partnerships across the value

chain, which calls for the creation of new kinds of interactions between suppliers, manufacturers, distributors, customers, and recyclers, for instance.

2.5 Eco-innovation should consider all three aspects of sustainability: economic, social and environmental

This is significant because, up until now, the majority of businesses have only paid attention to the financial gains generated by their operations. Companies must also try to provide social benefits for customers, employees, and stakeholders (e.g., improved gender equality, job creation, better pay and working conditions, more equitable profit distribution along the value chain, etc.) in addition to reducing the environmental impacts of their products. For the majority of businesses, these are fresh difficulties, but they must be overcome if the business is to have a successful, long-term future and contribute to the creation of a sustainable society. How businesses might obtain a competitive edge while providing this societal contribution is explained in the next subsection.

2.6 Why Do Companies Need to Eco-Innovate?

Manufacturing industry executives are increasingly aware that sustainability risks including climate change, worker welfare, and resource shortages are significantly affecting how manufacturing organizations conduct business. These sustainability threats act as motivators for changing how businesses run. Companies won't be able to adapt to problems like rising energy prices, disruptions in the supply of their raw materials, or legislative changes if they continue with "business as usual." Companies who do not act now are ultimately more likely to fail when these concerns inevitably affect their sector (UNEP 2020). Therefore, there is an increasing need to identify alternative strategies that may satisfy business drivers connected to sustainability while also providing chances for expansion, cost savings, and competitive advantage. By identifying the key sustainability threats and opportunities and using them to drive changes across the company and its value chain, from the business strategy and business model to the operational level, eco-innovation is an approach that seeks to satisfy these various requirements. Understanding the business case for action from the standpoint of the organization is crucial before developing eco-innovation implementation services. Numerous ways in which eco-innovation may generate value for a company have been highlighted by the experiences of businesses that have successfully adopted eco-innovation (Chukwuka et al., 2018).

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Figure 1: Added value derived from eco-innovation or Eco-innovation Drivers.

Source: United Nations Environment programme (UNEP) (2020)

- **Increase profitability along the value chain**

In order to boost profitability along the value chain, industrial methods may be changed to decrease significant impacts and products can be designed to make it simpler to recover and reuse resources.

- **Stay ahead of standards and regulations**

It's common to think of complying with environmental laws as a pricey but essential endeavor. On the other hand, it may also be a source of competitive advantage if, for example, regulatory changes result in fresh market possibilities that are only seen by top organizations. If the business adopts a leadership position and is successful in persuading legislators to propose legislation that is consistent with their own best practices, the advantage of this strategy may be leveraged.

- **Attract investments**

It might be challenging for large businesses undertaking eco-innovation to locate partners or suppliers who can significantly advance their sustainability initiatives. Small businesses who have demonstrated their ability to eco-innovate might thereby entice funding from these huge corporations to support scaling up manufacturing, enhancing product quality, etc. If the business is able to demonstrate major sustainability advantages as part of a financing request, public funds and grants may also be simpler to get.

- **Increase productivity and technical capacity**

Employees prefer to work for organizations that they perceive to be sustainable and ecologically responsible. A company can more easily attract and keep a skilled and motivated workforce, which will increase productivity and product quality, if it positions itself as a leader in areas like gender equality, employee welfare,

environmental performance, and corporate social responsibility. Additionally, eco-innovation frequently calls for new abilities and skills. Due to the nature of eco-innovation, it affects all aspect of a firm, from strategy and business model to operational tasks like design, production, buying, and marketing. Eco-innovation will typically need a change in how businesses operate. Eco-innovation needs to eventually integrate itself into the company's culture and operational procedures if it is to be effective. For individuals engaged, this kind of transformational change may be thrilling and fulfilling, but it cannot be completed fast or simply. To adopt eco-innovation, a corporation will need to make a large investment of time, money, and effort over an extended period of time. Obtaining this kind of dedication might be difficult (UN Environment, 2014).

- **Access to new and expanding markets**

Businesses that eco-innovate have a lot of new market potential. These might be access to markets that have strict sustainable procurement regulations and standards, completely new, emerging markets, or portions of current markets with a keen interest in sustainability.

Rennings, (2000) cited in Chukwuka (2018) believe that one way of measuring the reduction in environmental impact achieved by an eco-innovation is by stating the so-called factor X reduction in resource use. The factor 4 and factor 10 concepts originate in the Wuppertal Institute and are promoted by Von Weizsäcker and others as creative ways to reduce the resource intensity of economic activity (Halila and Hörte, 2006). Factor reduction refers to the idea of reducing the resource use per unit of service or product by a certain factor and can be achieved through a combination of technological, financial and lifestyle changes. It is vital to point out here, that the idea behind factor X reduction is that the actual environmental effect of innovation rather than the intention behind the innovation determines if a change is environmental”.

2.7 Key success factors to boost eco-innovation in Nigeria

The establishment of favorable conditions based on two levels of interventions, market-based instruments and targeted science, technology, and innovation policy is necessary for the formation of systemic eco-innovation at the national level. At the national level, having a defined strategy and goals for addressing societal concerns (eco-innovation macro-indicators) as well as vigorously promoting sustainable consumption and production practices are prerequisites. Additionally, the overall environment (amount of gaps, ease of doing business, ease of invention) is crucial in fostering both innovation and eco-innovation. (Dries et al. 2005, published in OECD (2005b). In most countries, the trade, industry, and science and technology ministries have been in charge of innovation policy, while the environment protection ministries have been in charge of environmental policy, with little effort being made to integrate these two policy domains, according to the OECD Synthesis Study on Framework, Practices, and Measurement of the Sustainable Manufacturing practices. While environmental policies often concentrate on "end of pipe solutions" rather than pollution prevention measures or a longer-term supply chain emphasis, the innovation strategy is typically too broad to adequately address particular environmental challenges. Despite the recent introduction of a few market-oriented tools, such green fees and tradable licenses, there hasn't been much of a shift. Eco-innovation will need to take steps to guarantee that the whole innovation cycle is effective in order to reach its full potential. These steps might include policies that encourage the commercialization of both established and ground-breaking technology as well as appropriate funding in research. (OECD, 2009)

A greater convergence of environmental and innovation policies would be advantageous. At the market level, a combination of market-based tools can be developed for eco-innovation, including supply-side tools (equity

support, research and development (R&D), education and training, networks and partnerships, and provision of infrastructure) and demand-side tools (regulations and standards, public procurement and demand support, technology transfer).

2.8. Environmental Commitment (Eco-Commitment)

Commitment generally, is the willingness to work hard and give your energy and time to a job or an activity. (Motivation, Vision, and Commitment), the vision an entrepreneur follows may be influenced by different factors. These factors are also the case for the ecopreneur's vision, and because the ecopreneur follows an ecopreneur vision, it is preceded by one, or a mixture of three forms of environmental commitment: affective commitment, continuance commitment and normative commitment". Keogh and Polonsky (1998) cited in Chukwuka (2018) modify the model of organisational commitment proposed by Meyer and Allen (1991) and its three dimensions of engagement stated above, so that it becomes a commitment to the environment, and then apply it to entrepreneurship. If not correctly pointed out, commitment to the environment may appear like commitment to an idea or issue. Keogh and Polonsky (1998) argue that the commitment to ideas is problematic, not least because it is not very well researched. They propose instead that the environment is regarded as an entity, not only a physical entity, but also an entity made up of the various forces that aim to bring it on the company agenda, like regulations, market forces and internal forces. Both individuals and organisations can display commitment in this model.

Affective commitment is an emotional attachment to the environment, something that makes the consideration of environmental concerns and the achieving of environmental goals an end in itself. This is the strongest form of environmental commitment, and an ecopreneur operating under affective commitment to the environment will always strive for the most environmentally friendly solution possible. This will not only lead to more radical eco-innovations, but it will also result in exploiting eco-opportunities that others don't see or perceive as marginal or uninteresting (Keogh and Polonsky 1998).

Continuance commitment is concerned with the economic and social cost of disregarding environmental concerns, or what economists call opportunity cost. Someone operating under continuance commitment strongly respects social and economic norms, and will, therefore, direct efforts to pursue eco-opportunities which are socially but also economically "acceptable". Since this approach aims to minimise tangible and intangible cost, as in the form of a tarnished public image, to the company, which may be arising from disregarding environmental concerns, the eco-opportunities. It exploits, and the eco-innovations it delivers will be more limited in scope than those of the ecopreneur operating under affective commitment (Keogh and Polonsky, 1998).

Normative commitment means that the person guided by it will respond to a feeling of obligation or indebtedness. This deficit may be caused by external influences, such as environmental protection laws, or by the individual identifying obligations to the environment. One key feature of this form of commitment is that the people and organisations guided by it, will exploit eco-opportunities and produce eco-innovation only to the point their feeling of indebtedness warrants them to, and limit consideration for the environment that goes beyond that point. When environmental legislation or rules cause the sense of indebtedness, this leads to the ecopreneur only fulfilling the bare minimum requirements, and this form of commitment may then be regarded as weakest (Keogh and Polonsky, 1998).

2.9 Eco-Opportunity

When economic activity creates environmental degradation or social damage, economists have sought to attribute this fact to market failures. Entrepreneurship theory often identifies inherent opportunities in market failures, for entrepreneurs to exploit and thereby accrue entrepreneurial rents. Dean and McMullen (2005)

cited in Kainrath (2009), identify a list of environmentally relevant (i.e. damaging) market breakdowns, explain how they may cause environmental degradation, and suggests how ecopreneurs may remedy them and mitigate the environmental degradation, thereby exploiting environmental (eco-)opportunities. Based on how the different eco-opportunities are exploited, Dean and McMullen (2005) develop a theory of environmental entrepreneurship. The following market failures are proposed as possible sources of eco-opportunity: public goods, externalities, monopoly power, inappropriate government intervention, and imperfect information. The authors themselves state that the list of identified market failures may not be complete, and may be amended by other authors. They also admit that not all market failures, even if environmentally relevant, necessarily constitute eco-opportunities (Dean and McMullen, 2005). Market failure is defined as: “the failure of a more or less idealised system of prize-market institutions to sustain desirable activities or to discontinue undesirable activities”. (Dean and McMullen, 2005) An eco-opportunity is supposed to be an environmentally relevant market breakdown, which if given a cost-effective solution, people would pay for to have it removed. By exploiting this eco-opportunity, the ecopreneur not only achieves entrepreneurial rents but also alleviates an environmental burden (Dean and McMullen, 2005). Environmentally friendly products or services may be directly beneficial to the environment, or at least be less harmful impact than their non-environmentally friendly alternatives (Pastakia, 1998). An ecopreneurs rent arises from the exploitation of an eco-opportunity. It accrues to the ecopreneur who first seizes a new opportunity, which because of the lack of competition generates above-average returns (Dean and McMullen, 2005).

2.10 Theoretical Review

Ecological Modernization Theory

This theory was used in this study as a framework for the investigation. These individuals support the ecological modernization theory, which also offers an economic justification for environmental entrepreneurs (Hajer, 1995; Mol, 1995). The theory is that by giving the environment more importance, economic growth may be stimulated. It is no longer essential to compromise between environmental quality and economic progress (Tillery and Young, 2009). The ability of the capitalism economy to create long-term remedies for environmental issues is widely acknowledged. It is possible to enhance the environment by utilizing the innovative spirit of capitalism (Beveridge and Gug, 2005). According to the ecological modernization theory, "the environmental problems facing the world today, act as a driving force for future industrial activity and economic development" (Murphy, 2000, p. According to the progressive modernization theory (Gibbs, 2009; Mol and Spaargaren, 1993; Tillery and Young 2009), entrepreneurs are the main agents of change in the process of transformation to avert an ecological disaster because this new generation of ecopreneurs seeks to combine environmental consciousness and traditional entrepreneurial activity to achieve economic success, entrepreneurial action is thus the greatest answer to our environmental challenges (1998, Anderson). In the overall shift to a more sustainable business model, ecopreneurs have the potential to play a significant role (Schaper, 2002).

The justification for using this theory is that ecological modernization theorist believes that “the environmental problems facing the world today, act as a driving force for future industrial activity and economic development” The theory also believe that it is possible to promote economic growth by giving higher priority to the environment. It is no longer necessary to trade off economic growth for environmental quality. This theory has served as a morale booster for ecopreneurs. This theory has given credence to the study of eco-innovation.

2.10.1 Other Views Expressed Along the Lines of Eco-Innovation Study

(a) Klimova and Zlek, (2011) Views on Ecological Sustainability

According to Klimova and Zlek (2011), ecopreneurship is crucial because in the future, eco-innovations will give businesses and nations a competitive edge. They contend that new and innovative environmental technologies, services, and processes will be the more significant sources of competitive advantage and that if businesses and nations want to succeed in the global market, they cannot rely on having low costs as their competitive advantage. Our economic system's long-term viability depends not only on quantitative growth but also on ecological sustainability and development (Klimova and Zitek, 2011). Additionally, there are also sound commercial justifications for the necessity for eco-innovation in order to address our environmental issues. First, there is a finite amount of our resources, such as fish, minerals, or gas. If we do not sustain them, many of them once used out cannot be replenished, leaving us with decreasing or no national resources.

Also, because of economic activity and consumption, most of our resources become waste. As a result, we have the problem of pollution, which seriously affect humans and the ecosystem and lead to greenhouse gas accumulation and potential climate change (Volery, 200, p. 542). To sustain them, ecopreneurship is important to constantly look for alternatives, e.g. recycling or new sources of energy, such as wind, water, and solar (Arber and speech, 1992: Barnes, 1994). Second, the global population growth is also influencing ecopreneurship. The world population is expected to increase by 50% by 2050 and with it will come an increase in consumption (World Business Council for Sustainable Development 2002). Although part of this consumption is important for relieving poverty in many emerging countries, most it will be done by affluent consumers, and can have negative impact on the ecosystems (Volery, 2002, p. 542). Eco-innovation is therefore important to find the new technologies to protect the environment and to ensure that there are enough resources to fill the needs of both the current population and future generations (Volery, 20012).

Thirdly biodiversity loss also justified entrepreneurship action to solve environmental problems. Volery (2002), posit that “the rates of takeover of wild life habitat, and of species extinction are the fastest they have ever been in human history and are accelerating. Goodland (1991) also reported that the tropical forest, the world’s richest species habitat has already been 55% destroyed and the loss in containing. Given the need for environment sustainability, there is need for a new kind of entrepreneur who will incorporate environmental concerns into the consideration of their bottom-line (Volerny 2002).

2.11 Empirical Review

This section encapsulates an empirical evidence of related study done elsewhere discovered through literature review with their methods and findings.

Chukwuka et al., (2018) discovered in their study of Sustainability-Oriented Practices of Eco-Innovation, Eco-Commitment and Organizational Performance of a Developing Economy that Eco-innovation was empirically found to have positive effect on the market share of selected manufacturing firms in a developing economy. They concluded that the implementation of green business practices, principles and processes will lead to very positive outcome that will be visibly manifested in the organization and the environment. The technique for the study's survey design was used. The ten manufacturing companies in Nigeria were chosen using a straightforward random selection approach. Using the Cochran (1977) statistical technique, a sample size of 543 respondents was picked from a population of 5705 people from the management, middle, and lower cadre of the chosen manufacturing enterprises. To assess the proportional distribution of the questionnaire to the management cadre, middle cadre, and lower cadre, a stratified sample approach was also utilized. For gathering primary data, a designed questionnaire and in-person interviews were utilized. The survey was formatted using a 5-point Likert scale. Utilizing content validity, the instrument's validity was determined.

Using the test-retest approach, the instrument's reliability was evaluated, and the result was 0.90, indicating consistency in the survey's items. Utilizing linear regression analysis, the data were analyzed and the hypotheses were evaluated. The 5% level of significance for probability was used. Simple percentages were used to show the data.

Nollman (2013) looked at how sustainability measures affected workplace efficiency and worker output. The researcher set out to address the issue of workplace sustainability efforts and worker productivity. Peer review of an academic journal database employing performance metrics and sustainability in the workplace was the approach employed to reach his conclusion. The study found that switching from non-sustainable to sustainable workplaces resulted in an average improvement in employee satisfaction and workplace productivity of 21.4%. Scores on the satisfaction scale varied from 1.30 to 2.36, with an average of 1.86.

The impact of business environmental sustainability on economic performance and profitability was examined by Russo and Fouts (2014). They set out to address the issue of the connections between business environmental sustainability, financial success, and economic performance. Survey design was the approach utilized, which involved gathering data from a survey and testing hypotheses through an analysis of 243 firms over a two-year period using independently created environmental evaluations. The findings show that "going green pays off," and that this association gets stronger as the business expands. They highlighted the study's managerial and academic implications in their conclusion, paying particular attention to the social challenges discussed in management literature. The study's conclusion was that environmental sustainability, economic performance, and profitability are all positively correlated, and that industry expansion moderates this relationship, with environmental performance rewards being larger in high-growth businesses.

2.12 Knowledge Gap or Gap in Literature

A comprehensive review of related literature has revealed that this field of Eco-innovation and Business with regards to environmental sustainability is still in infancy with paucity of literature. Therefore, the failure of market-based tools and government command and control systems to prevent harmful environmental externalities and the undervaluation of natural resources due to the actions of profit-driven entrepreneurs leading to overexploitation and depletion make this study necessary and in high demand as well as a solution to the challenges of environmental sustainability. This study will raise the frontiers of knowledge in the emerging field of study. This is also a leading study in this emerging field in sub-Saharan Africa where climate change is a reality like other parts of the world.

3.0 Methodology

This study adopted the descriptive survey design which allows for the collection of original data from the respondents, describes the present situation and problems in their natural setting and permits a sample representing the population to be drawn. This research design is considered most suitable for the study because it was well suited to the description and correlative nature of eco-innovation study, the questionnaire and oral interview collected quantitative and qualitative data of 543 employees of the selected firms in Nigeria (Management cadre, middle cadre and lower cadre) with rich eco-innovation profiles were randomly selected. Out of the 543 questionnaires distribute, 528 were returned valid and 15 questionnaires were discarded for incomplete information. The data collected were useful in measuring the eco-innovation variables and testing the specified hypotheses of the study, most of the data generated from the questionnaire survey were ordinal in nature (responses were mainly ratings measured on the Likert scale).

4.0 Discussion and Result

A total of five hundred and forty three questionnaires were distributed to the randomly selected eco-innovation profiled firms in Nigeria. A total of five hundred and twenty eight were returned completed. Fifteen copies were invalidated for incomplete information.

Analysis of Data

Table 4.1: Table of Response Ratio: Management Structure

Respondents	Number Distribution	Number Returned	% Return	Number Unreturned	% Unreturned
Management Cadre	50	45	90	6	
Middle cadre	183	180	98.36	4	
Lower cadre	307	303	98.70	5	
Total	543	528	97.78	15	

Source: Field Survey, 2023.

Table 4.2: Age Distribution of the Respondents

Age	No of response	Percentages (%)
18- 24	50	9.5
25-35	170	32.2
36-44	280	53
57 and above	28	53
Total	528	100

Source: Field Survey, 2023.

Table 4.2 shows the age distribution of the respondents. 50(9.5%) are below 25 years while 170(32.2%) are between 25-35 years of age and 280(53.0%) are within the age bracket 36-44 and 28(53.0%) are 57 years and above.

Table 4.3: Educational Qualification of the Respondents

Educational Background	Number of Respondents	Percentage
O' level	65	12.3
OND/NCE	170	32.2
HND/BSc, BA	240	45.5
MA/M.Sc /MBA	50	9.5
Above masters	3	0.57
Total	528	100

Source: Field Survey, 2023.

According to the study's findings, 65 (12.3%) of the participants have an O' level, while 170 (32.2%) have an OND or NCE and 240 (45.5%) have an HND or a BSc or BA. While just 3 (.5%) have a master's degree or above, 50 (9.5%) have an MA, M.Sc., or MBA. By applying Bowley's proportional

allocation statistical approach, the sample size for each stratum is determined using Table 4.1, the table of response ratio, and the management structure profile. Table 4.2, "Age Distribution of the Respondents," relates to and is pertinent to this study in determining if the questionnaire is distributed fairly across the population's age range. The degree of comprehension of respondents to eco-innovation ideas reflected in the questions included in the questionnaire and oral interview may be determined by looking at Table 4.3: Educational Qualification Profile of the Respondents, which is connected and relevant to this study.

Table 4.6: Eco-innovation effect on business profitability and environmental Sustainability

Statement of variables	SA	A	U	D	SD	Mean	St.d
Eco-innovation is practiced and implemented in your firm.	150(28.41)	265(50.2)	55(10.4%)	30(5.7)	28(5.3)	3.9	.25
Eco-innovativeness to a greater degree affects positively your firm's profitability.	285(54.0)	192(36.3)	13(2.5)	20(3.79)	18(3.4)	4.3	.23
Management and workforce practicing of eco-innovation have led to high degree of customer's loyalty to your firm's product and sustainability of the environment.	180(43.1)	190(35.9)	50(9.5)	70(13.3)	38(7.2)	3.7	.26
Eco-innovation generates new ideas and process that's positively associated with customer's satisfaction.	306(58.0)	58(10.9)	34(6.4)	100(18.9)	30(5.7)	1.4	.74
Eco-innovation generates new technologies in product manufacturing.	188(35.6)	295(55.9)	10(1.89)	18(3.4)	13(2.5)	4.2	.24

Source: Field Survey, 2023.

Table 4.6 displays the participants' opinions on how eco-innovation affects the profitability of the chosen manufacturing companies. According to the results, 150 participants (28.41%) strongly agreed that eco-innovative practices are used and implemented, whereas 265 people (50.2%) agreed and 55 participants (10.42%) were unsure. 30 people (5.7%) disagreed, while 28 people (5.3%) severely disagreed. The practice of eco-innovation is consequently implied to be fully adopted based on the mean and standard deviation being 3.9 +.25.

Additionally, the study's findings indicate that 285 (54.0%) of the participants strongly agreed that eco-innovation significantly impacts your company's profitability. 13 people (2.5%), out of 192 (36.3%), are unsure. Up to 20 (3.79%) and 18 (3.4%) disagreed, respectively. According to the mean and standard deviation of 4.3 +.23, the eco-innovation increases the profitability of your company. Additionally, the results showed that Management and workforce involvement in eco-innovation has increased consumer loyalty to your

company's product by a mean and standard deviation of (3.7 +.26). This conclusion is based on 180 (43.1%), 190 (35.9%), and 50 (9.5%) strongly concurring that management and employee involvement in eco-innovation has increased consumer loyalty to your company's products. Only around 70 (13.3%), 38 (7.2%), and respectively 38 disagreed and strongly disagreed.

The study's findings show that a company's eco-innovation provides fresh concepts and methods that are favorably correlated with customer satisfaction using a mean and standard deviation of (1.4 +.74). In light of this, 306 (58.0%) strongly agreed that a company's eco-innovativeness produces fresh ideas and methods that are favorably related to customer happiness, 58 (10.9%) agreed, and 34 (6.4%) were unsure. In contrast, 30 (5.7%) strongly disagreed whereas 100 (18.9%) disagreed.

The study's final finding reveals that 188 (35.6%) of the participants strongly agreed that eco-innovation creates new technologies for product manufacture. While 10 (1.89%) are unsure and 295 (55.9%) are in agreement. 13 (2.5%) individuals strongly disagreed, and 18 (3.4%) participants disagreed. According to the study's findings, eco-innovation creates new technologies for the production of goods (4.2 +.24).

Hypothesis

H₁: Eco-Innovation has a significant and positive effect on profitability and sustainability of selected firms.

Profitability model:

$$P = f(B_0 + B_1ES + B_2ST + B_3ROI + B_4ESP + B_5SE + B_6ED + e)$$

Where:

P	=	Profitability
f	=	Function
B ₀ - B ₆	=	Constants
ST	=	Sales Turnover
ES	=	Ecological Sustainability
ROI	=	Return on Investment
ESP	=	Ecological Sustainability Project
SE	=	Sustainability Entrepreneurship
ED	=	Environmental Degradation
e	=	Error Margin

Table 4.15: Descriptive Statistics

	Mean	Std. Deviation	N
Eco-Innovation	2.1794	1.42308	528
Market share of Manufacturing Firms	2.5840	1.44325	528

Source; SPSS version 17.0

Table 4.16: Model Summary

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
1	.874 ^a	.764	.763		.69265	.369

a. Predictors: (Constant), Eco-Innovation

Source: SPSS version 17.0

Table 4.17: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.048	.088		.542	.588
	Eco-Innovation	.862	.030	.874	29.012	.000

a. Dependent Variable: Market share of Manufacturing Firms

Source: SPSS version 17.0

Result Summary

R = .874^a
 R² = .764
 F = 841.711
 T = 29.012
 DW = .369

Interpretation

The market share of manufacturing companies had a mean answer of 2.58 + 1.44 and the descriptive statistics of eco-innovation had a mean response of 2.18 + 1.42. This suggests that there is roughly the same degree of data point variability across the dependent and independent variables since the standard deviation scores show little variation in standard deviation values.

Eco-innovation and market share of manufacturing enterprises are strongly positively correlated, according to R, the correlation coefficient, which has a value of .874. According to the R square, or coefficient of determination, eco-innovation accounts for 76.4% of the variation in market share of manufacturing companies. The remaining 23.6% is explained by additional factors. The error of estimate for the linear regression model is small, with a value of about .69265. There is no autocorrelation, according to the .369

Durbin Watson statistics, which is not more than 2. Given that the regression sum of squares (403.828) is higher than the residual sum of squares (124.740), the model is able to account for a larger portion of the variance in the dependent variable, proving that the model is not random.

The significance of the model $MS = .048 + .862(\text{Eco-innovation}) + e$ is demonstrated by the value of F-statistics = 841.711. The amount that eco-innovation influences manufacturing business market share is shown by the value of $\beta = .874$, which shows a positive relationship between eco-innovation and manufacturing firm market share that is statistically significant (with $t = 29.012$ and $p = .000 < 0.05$). Given that the model's significance value is (0.000), which is less than 0.05, the model is significant.

The decision rule is to reject the null hypothesis if the probability value of (0.000) is less than the chosen 5% alpha level otherwise do not reject the null hypothesis. Therefore, the null hypothesis is rejected and the alternate hypothesis is therefore accepted that Eco-Innovation has a positive and significant effect on market share of selected manufacturing firms.

Discussion of Findings

According to the study, eco-innovation significantly and favorably influences the profitability and viability of businesses of firms under study and environmental sustainability ($r = .874$; $F = 841.711$; $T = 29.012$; $p = .000$). The aforementioned conclusion has supported the field survey's claim that eco-innovation significantly and favorably affects the profitability and viability of businesses of certain manufacturing enterprises. This result concurred with Lin and Geng's (2013) research on the impact of market demand, green products, and eco-innovation on businesses' performance, which revealed a positive relationship between eco-innovation and firm profitability. They also confirmed a link between eco-innovation and profitability and business performance.

4.1 Conclusion

The study through its empirical evidence concludes that eco-innovation significantly and favorably influences the profitability and viability of businesses studied and also has a positive and significant influence on environmental sustainability. This means that eco-innovation is a confirmed potent solution to the failure of market-based tools and government command and control systems to prevent harmful environmental externalities and the undervaluation of natural resources due to the actions of profit-driven entrepreneurs leading to overexploitation and depletion. The study also concludes that organizational practices of eco-innovation have led to high degree of customer's loyalty to firm's product and sustainability of the environment. The study concluded its finding by asserting that Eco-innovation generates new technologies in product manufacturing and redesigns through eco-innovation practices and principles. The study also concludes by revealing that Eco-innovation generates new ideas and process that's positively associated with customer's satisfaction.

4.2 Recommendation

Based on the findings of this study, we recommend that business organizations should adopt eco-innovation principles, practices and behaviours which is a potent solution to the failure of market-based tools and government command and control systems to prevent harmful environmental externalities and the undervaluation of natural resources due to the actions of profit-driven entrepreneurs leading to overexploitation and depletion as well as a proven profitability model for businesses.

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