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Assessment of Eco-Innovation Drivers within the Informal Sector in Ghana

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Abstract: Informal enterprises and their activities dominate the economy of the Sub-Saharan Africa (SSA). However, despise the increasing volume of eco-innovation research in recent years, the drivers of the eco-innovation of small medium enterprises (SMEs) in the informal sector remain largely unknown. Drawing from a triple theoretical anchoring method (entrepreneurship theory, shareholder theory, and resource theory), this study tests the validity of a set of eco-innovation drivers developed around the concept among firms of the informal sector in Ghana. The conceptual framework was tested using structural equation modeling and the data were obtained using the World Bank's Ghana Informal Enterprise Survey (GIFS) as an area-based frame to survey 285 local entrepreneurs (n = 285). The results confirmed that informal enterprises do eco-innovate (mainly incremental innovation), and that innovation activities are driven by a government's incentive regulations, market demand, and local entrepreneurs' characteristic of hometown identity. This research highlights the contributions of the informal sector to sustainable development and draws the attention of policymakers, non-government agencies, and researchers on the drivers leading eco-innovation activities in the informal sector. The results could be used for future policy formulation.

Keywords: informal sector; eco-innovation; hometown identity; entrepreneurial theory

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1. Introduction

The importance of eco-innovation for social, economic, and environment benefits is well established [1–3]. Currently, developing countries have started focusing on how to promote eco-innovations in both large and small enterprise for sustainable growth [1,4]. Such ambition is reflected in recent policies and regulations such as the 'Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024)', which was endorsed by the African Union in 2014. These policies aimed to encourage and support eco-innovation-driven development thinking [5,6]. Eco-innovation was first defined as an innovation that "meets the needs of the present without compromising the ability of future generations to meet theirs" [7].

Although government policies and regulations have the potential to drive eco-innovation, they are often inclined to overlook the 'dualistic' economic structure and social importance of 'hidden' innovations in the informal sector [8]. This sector represents 90% of small and medium enterprises (SMEs) and 50 to 60% of jobs in the Sub-Saharan Africa (SSA) [9,10]. With their flexibility and ability in serving different local markets as compared to large organizations, the informal sector has acquired a competitive edge [11], a direct impact on the local community [12], and better opportunity to integrate social and environmental benefits into the value of their goods [9]. While large firms' whole structure sections of the economy and the volume of their activities are key players in sustainable development

policies, the trend towards the economic, social, and environmental responsibility can only become sustainable with the involvement of the critical mass of firms at the informal sector. Therefore, the importance of these local firms for eco-innovation in developing countries such as Ghana cannot be ignored [13,14]. Our study investigates the drivers of eco-innovation among SMEs in the informal sector.

Drivers of eco-innovation among SMEs in the informal sector remain unknown because of a lack of data [15], research interest [16], and, most importantly, the complexity of the nature, the characteristic, and environment in which these firms operate [17]. Researchers describe the informal sectors by their (1) heterogeneous type of entrepreneurs (e.g., sustainable entrepreneurs, institutional entrepreneurs, social entrepreneurs, circular entrepreneur, necessity entrepreneurs); (2) SMEs' special characteristics (Sole proprietorship); (3) unconventional environmental context [18,19]. In the setting of the informal sector, all principles or building blocks of the circular economy are not yet feasible or known [20]. It is typical of SMEs to operate according to the principles that perfectly fit a circular economy without knowing its concepts or to produce eco-products before even estimating if there is a demand or opportunity to sell them in the market [21]. Interestedly, the informal entrepreneurs may be less concerned about the environment than the opportunity to make use of the available resources at hand [22]. Furthermore, SMEs' management system is integrated; that is, the goals, the environment, the organization, and the activities cannot be analyzed separately [23]. For many of these sole proprietor firms, the entrepreneur plays a predominant role: the smaller the firm, the less formalized the management is and the more the decisions are centralized at the level of the entrepreneur [24,25]. Subsequently, the entrepreneur is critical to the success or failure of innovation activities or efforts of the firms, so that the personality of the leaders and their beliefs, as well as their perception of the environment, determine the strategy of the company and guide the decisions [26,27]. Surely, considering the informal sector complex and the extraordinary setting, firms and entrepreneurs in this sector do not necessarily or always fall within the parameters constructed by Western literature about motivation or strategy to eco-innovate. Thus, understanding the drivers of eco-innovation in the informal sector will prevent the over-generalizations of findings that normally occur the case of literature on developing countries.

In general, previous research findings have suggested three groups of determinants, including: (1) external pressures, such as stricter governmental regulation measures and stakeholder's pressure [28–32]; (2) market pressure, such as recognition that can improve reputation and lead to a competitive advantage [33]; (3) technology pressure associated, used to increased performance through cost reduction [34]. In addition, findings have suggested that eco-innovation drivers differ across: (1) eco-innovation types that include process vs. product or new-to-the-firm vs. new-to-the-market eco-innovations [3]; (2) eco-innovator features including large vs. small and old vs. new firms [9]. For instance, on the one hand, large firms' eco-innovation is driven by the need of higher public visibility, the corresponding pressure from environmental non-governmental organizations (NGOs) [35], greater financial and human resources [36], and the existence of a systemized research and development (R&D) department [37]. On the other hand, small firms' eco-innovation drivers evolve around their social circumstances and environment [38].Some of these studies have specifically analyzed industrial companies [37,39]. Others have taken an interest in this same question, studying both service and manufacturing firms [38]. However, none of the studies were performed in relation to the informal sector, and very few have examined drivers of eco-innovation in developing countries. It is unknown to what extent the original set of eco-innovation drivers developed around the concept are valid for SMEs in the informal sector, given the special circumstances surrounding their activities.

Developing countries such as Ghana have a keen interest in promoting eco-innovation by seeking the direct involvement of the local community in the process [40,41]. In Ghana, the most serious environmental challenges include: (1) the highest deforestation rate in

the world (2 percent per annum) [40,42] and (2) a public health crisis that has emerged from the ideology and agenda associated to globalization [1,43].Theses structural changes, which sacrifice long-term sustainability, have resulted in the forced adaptation to a linear economy of single-use and indiscriminate disposal [44]. For instance, for the purpose of meeting international development demands, Ghana aimed to solve the public health issues of water-borne illness through the use of the plastic packaging of commodities, notably the water sachet. However, the overwhelming abundance of plastic litter has inflamed the latter health crisis [45,46]. Similarly, the implementation of regulations against the abusive use of environmental resources are faced with a complex internal struggle amongst citizens (e.g., 5,276,770 (18.2%) jobs provided by plastic manufactures), the government (in position of dependence from foreign investor), and international actors [47,48]. Subsequently, in order to solve this complex situation, the government of Ghana has adopted a hands-off approach, placing the responsibility on citizens in the local community to encourage waste clean-up and to eco-innovate through the concept of hometown identity [20,40].

Hometown identity is a notion based on the idea that an activity of the entrepreneur is linked to the community in which he operates beyond compliance with laws and regulations [49,50]. Enrègle and Souyet [50] posited that hometown identity results from an entrepreneur's (1) awareness of the issues of their society, (2) an interest in ecological problems, and (3) subsequent sanctions by civil society. In the literature, previous research has indicated that hometown identity is linked to a psychological bias that influences political leaders' decision-making [50,51] and entrepreneur's favoritism and acquisition behavior [52,53]. However, no psychological processes have been identified to explain how entrepreneur's hometown identity influences firms' strategic decisions and outcomes, nor has the concept of entrepreneur's hometown identity been applied to the context of eco-innovation in the informal sector.

In terms of contribution, this article attempts to carrying out a statistical and econometric analysis. It contributes to the empirical literature on eco-innovation on several levels. First, for the first time, this article presents a cross-sector analysis of drivers for eco-innovation among local SME firms in Ghana's informal sector. Second, instead of considering eco-innovation drivers as similar in all contexts, this study takes into account the special circumstance in developing a country's informal sector that impacts startup motivation to eco-innovate. Thirdly, drivers of eco-innovation at the informal sectors are categorized according to the novel persuasive psychological model that incorporates the push–pull (PPM) paradigm. We hypothesize that altruistic value, as well as the hometown identity of the entrepreneurs and resource (un) availability, are push factors for eco-innovation, while market opportunity (MO) and government regulations are pull factors. The aim is to suggest ways that could promote the development of eco-innovation among SMEs located in the informal sector to policymakers. The paper is organized as follows: The theoretical foundation as well as the development of the hypotheses are presented in the next section. The third section introduces the econometric technique and presents the data and some descriptive statistics. The key findings are explained in the fourth section. The final section draws the main conclusions from the analysis.

2. Literature Review

2.1. The Theoretical Background

Eco-innovation is a fuzzy and ambiguous notion often referred as an innovation that "meets the needs of the present without compromising the ability of future generations to meet theirs" [7]. Applied and appropriated by each particular firm, the concept of eco-innovation implies that profitability remains the main objective in order to ensure the long-term survival of the firm, but also that this profitability cannot be acquired at any price [54]. Respect for the environment, society, and people are just as important. The firm pursuing a sustainable strategy must achieve the most harmonious balance possible between these three dimensions, including environmental, social, and economic [3].

Thus, by definition, eco-innovation is assimilated and difficult to be dissociated from the theme of corporate social responsibility of which it enriches and from which it draws various concepts.

Drivers of eco-innovation have been studied using a variety of economic and organizational theories such as corporate environmental management theory [55], induced innovation theory [56], actor–network analysis [57], environemental economics [58], and organization studies [59]. Meanwhile, a rational theoretical framework is required for the application of various ideas to eco-innovation processes and management. Related to this, two perspectives are opposed by Capron and Quairel Lanoizelée [60]. The first combines classical and liberal approaches [60], stakeholder theory [61], and resource dependence theory [62], and posits that organizations require resources from their surroundings in order to thrive. Thus, because of resource dependency, an organization might be controlled by the constituents who own those resources. As a result, organizational behavior can only be understood within the context of the organization's connections with other social actors. The second paradigm brings together neo-institutional sociological theories [63,64] and is based on "a symbolic representation of organizational decisions, embedded in a social network and seeking legitimacy, a "proper" image despite the conflicting and contradictory expectations of actors in the organizational field". The literature shows that the resource-based theory has been utilized more than the neo-institutional sociological theories in empirical studies to evaluate organizations' commitment to eco-innovation and to comprehend the advantages that may be generated from it. While studies that combine views of both perspectives exist [60], they are more uncommon [38].

In the context of this study, entrepreneurial theory proposes an acceptable framework for analyzing drivers of eco-innovation and a reliable foundation for appropriate policy recommendations [61,65]. In comparison to neoclassical economics, entrepreneurial theory is better at analyzing transitions and learning processes. Rather than optimization, it requires constrained rationality and rules of thumb [66]. The entrepreneurial theory focusses on three important aspects including: the nature of opportunities, the nature of entrepreneurs, and the nature of the decision-making framework, within which is an entrepreneur function [19,67]. The entrepreneurial theory examines paths and different sorts of inventions, providing thorough explanations on technological change and competition, as well as socio-technical systems [68]. Within the context of socioeconomic dynamics, the entrepreneurial theory also gives insight into the market's ability to become green. This theory can be combined with (1) the stakeholder theory, a reference theory for the study of corporate social responsibility that has the potential to operationalize the external component of the concept of eco-innovation for the firm [61], and (2) the more appropriate resource theory approach for the internal component [69]. Based on these theories, this study establishes a methodology for analyzing drivers to eco-innovation among SMEs in the informal sector in Ghana.

2.2. Drivers of Eco-Innovation and Research Hypothesis

Although numerous research studies have been performed on the factors that influence eco-innovation, very few academics have looked at the drivers of eco-innovation in the informal sector [16]. Findings in the formal sector have identified government regulation, knowledge, markets, as well as broad categories of internal and external factors as drivers of eco-innovation [9,18,38]. However, as entrepreneurs in the informal sector face unique circumstances such as unemployment, a lack of infrastructure, and poor institutional structure, the drivers of eco-innovation in this setting might be different from theories and framework developed for Western economies. To fill this gap, in this study, drivers of eco-innovation are considered to be a result of government regulation and are either a recognized customer segment or customer need ("market pull" [19]) or a resource that is to be commercialized ("resource push" [70]). Beyond this traditional classification, people may also engage in eco-innovation simply because of their altruistic value or the feeling

of belonging in a community (hometown identity), making them want to play a part in solving a problem in their local community.

2.2.1. Government Regulations

Environmental public policies are defined by McCormick [71] as "any actions deliberately taken or not taken by government that are aimed at managing human activities with a view to preventing harmful effects on nature and natural resources, and ensuring that man-made changes to the environment do not have harmful effects on humans." This type of policy aims to encourage actions with beneficial effects for the environment and to improve the ecological performance of human activities. In the literature, two important tools often cited to encourage eco-innovation are public funding and regulations [72–74]. According to some economists, the public funding makes it possible to promote green innovation [74]. Studies performed by Chien et al. [75] and Demirel et al. [76] have argued that public funding could act as a knock-on effect on private investment in R&D, which can indirectly encourage the commitment of companies to eco-innovations, because financial aid makes it possible to counterbalance market imperfections, which are linked to the uncertainty of innovation activity and thus make it possible to achieve certain environmental objectives.

Related to regulations that can be in the form of laws, taxes, or standards, some research findings argue that they have the potential to stimulate eco-innovation in some cases, while they can be limited, ineffective, or even have a negative effect on firms' commitment to introducing eco-innovations in other contexts [75]. For instance, from the perspective of the static view of the general equilibrium theory, the regulations are generally considered to be a barrier, as they impose additional costs and can draw the firm's R&D away from its core business, thus eroding the competitiveness of firms' subject to these measures [77]. On the other hand, the now-famous Porter hypothesis [78] postulates that the establishment of regulations with the aim of reducing harmful impacts on the environment improves both the environmental performance and the competitiveness of firms, thus causing a so-called "win-win effect". In the same vein, the positive influence of public policy on eco-innovation was confirmed in a study by Leitão et al. [79]. This study examined the elements that influence eco-innovation in business units with varying levels of technological intensity (high technology versus low technology). The result suggested that, though public policy in general influences firms' eco-innovation, the impact is significant on high-tech firms. In addition, the implementation of regulations imposes a certain level of compliance on firms in order to be able to produce or market their products in the economic areas subject to these rules. Thus, government pressures, whether or not they are perceived as a constraint, can potentially cause firms to introduce green innovation. Brunnermeier and Cohen [80] investigated whether government pressure induces firms to reduce the cost of these pressures by introducing eco-innovations, or whether companies will simply suffer the penalty (such as the payment of a tax) without modifying their operation. The result showed that eco-innovation makes it possible to reduce the harmful impacts on the natural environment, although the findings did not prove a correlation between the existing governmental pressures and the incentive to eco-innovate. However, it is important to emphasize that regulations can encourage firms to eco-innovate according to the pressures that already exist, as well as according to those that firms anticipate will come by signal effect. In line with this, we hypothesis that:

Hypothesis 1 (H1). *Government's regulation of the business environment affects the level of eco-innovation among SMEs in local community.*

2.2.2. Market Demand Pull

Previous research has established the impact of market characteristics on pro-eco-innovation [79,81]. According to Leitão et al. [79], the most significant characteristics in this category are lower labor costs per unit produced (OLBR), entrance into new markets,

and increasing market quotas. Market pull is when the market demand of a solution to a problem or need in the marketplace drives the development of a new product [22]. It occurs when an opportunity arises from a need or a situation that begs to be addressed. For many firms, eco-innovation is a strategy in which, depending on the situation, can make it possible to reduce competition, increase market share, or enter new markets [82]. Related to this, Schmookler [83] suggested that demand is considered an important determinant of innovation. Without calling into question the role of technology, he postulates that the innovation effort is mainly concentrated on the products for which the demand is the most intense because the profitability of innovation depends on the size of the market. In the same vein, Ghisetti [84] thinks that demand is an essential determinant for the introduction of innovations with an ecological aim. These results assume that companies are making environmental efforts to improve their market share and productivity. Similarly, the econometric results of Horbach [85] confirm the hypothesis that current demand motivates companies to engage in eco-innovation, and that this effect seems to be even stronger when the company anticipates an increase in production demand for environmentally friendly products (anticipated demand). In addition, for T.J. Mierzwa [86], it is the market's pressure, demand, and interest that informs entrepreneurs that they need to act. In this case, external demands are identified, which prompts a search for viable solutions and results in a market-leading service. Therefore, we hypothesis that:

Hypothesis 2 (H2). *Market demand of environmental products affects the level of eco-innovation among SMEs in local community.*

2.2.3. Resources (un)Availability Push

Entrepreneurial possibilities are said to arise when distinct agents have insight into the worth of resources that other agents do not, and the agents with the knowledge take use of these underutilized resources [87]. The (un)availability of any resource is a critical factor in deciding whether or not to pursue a venture concept or company idea; hence, resource availability is an important aspect of eco-entrepreneurial motivation [88]. Some people begin their entrepreneurial endeavors by attempting to make efficient use of the resources they have on hand, while others begin because there is an abundant resource for which they seek purpose or a commercial enterprise. Thus, eco-innovation is fueled by a firm ability to draw on the resources it has access to through its network links, such as local R&D partnerships [89] and management connections [90].According to Ghiseti [84], an entrepreneur's motivation to eco-innovate is strongly influenced by the availability or lack of any and all resources. Resource scarcity, therefore, from the standpoint of entrepreneurship, encourages managers to adopt entrepreneurial behaviors, investigate new prospects, and, as a result, fosters innovation [91]. Thus, while some persons may begin to eco-innovate by attempting to make efficient use of the resources they already have at their disposal, others may begin because they have discovered a rich resource from which they wish to derive a purpose or start a business enterprise. Therefore, we hypothesize that.

Hypothesis 3 (H3). *Resources (un)availability is positively associated to eco-innovation performance among SMEs in local community.*

2.2.4. Social Push

According to Baker et al. [92], true entrepreneurial conduct is motivated by a variety of personal factors and influenced by the social context or background in which it occurs. The social role assumed by the individual is not only a facet of his activities, but also an indicator of his points of contact with various social networks [93]. His values and behavior therefore depend on his personality as well as on contextual factors such as his needs and desires or the values, objectives, and constraints of the group in which he belongs. Indeed, the sense of belonging of the individual can produce on his behavior an effect that

is reinforcing and stimulating eco-innovation as a strategy to preserve the local community environment. Therefore, hometown identity and the altruism value express the idea of the multiple roles assumed by eco-entrepreneurs, which represent for them the opportunity to combine their professional responsibilities with their civic sense.

- Altruism

Entrepreneurial intention, as a multidimensional concept, may be thought of as a deliberate activity guided by personal ideals [94]. In addition, human values are a major motivator of pro-environmental actions [95]. Research findings have shown that altruism has a major impact on individual behavior [96,97] and that personal value structure is the guiding concept of individuals that inspires them to contribute to others' or society's welfare. That is, altruism is action taken to improve the welfare of others at the expense of oneself [19]. According to Griskevicius et al. [81], most prosocial behaviors are altruistic. In the same vein, Berenguer [98] argued that altruistic ideals precede pro-environmental behavior. Moreover, altruism influences green behavior values [99] and environmentally conscious consumer behavior intentions [100,101]. Therefore, we hypothesize that:

Hypothesis 4 (H4). *Entrepreneur's altruistic behavior is positively associated to eco-innovation performance among SMEs in local community.*

- Hometown Identity

We anticipate that entrepreneurs' hometown identity has a favorable influence on eco-innovation in two ways, including being (1) based on the upper echelons theory and (2) the effects of place identity on decision-making.

First, the upper echelons hypothesis states that an entrepreneurs' psychological bias/preference will have a significant impact on the firm's strategic decision-making and outcome [102,103]. We claim that their hometown identity, a psychological bias resulting from place identification, influences company tactics significantly. Because individuals' hometowns are where they were born and raised, they will form an emotional bond with the natural environment of their hometown and, as a result, exhibit a kindly attitude and behavior toward it [52]. Thus, firms with local entrepreneurs are more likely to be concerned about local environmental concerns and to decrease pollution by actively producing environmentally friendly goods and enhancing the manufacturing processes' environmental performance [104].

Second, in Figure 1, because of place identity, people are more likely to pursue the interests of their hometown community [105]. Individuals who are emotionally tied to their hometowns may take economic concerns and the interests of the hometown group into account when making decisions [106]. As a result, individuals' pro-social motivation may be activated by their hometown identity, driving them to focus on the objective of assisting others based on a concern for the welfare of the hometown group. We argue that hometown entrepreneurs are more concerned about the well-being of other individuals in their communities and will demonstrate prosocial motivation and behavior. As a result, while pursuing financial gains, local CEOs are more inclined to safeguard the environment through green innovation methods that will benefit others [102]. Therefore, we hypothesize that:

Hypothesis 5 (H5). *An entrepreneur's hometown identity is positively associated to eco-innovation performance among SMEs in a local community.*

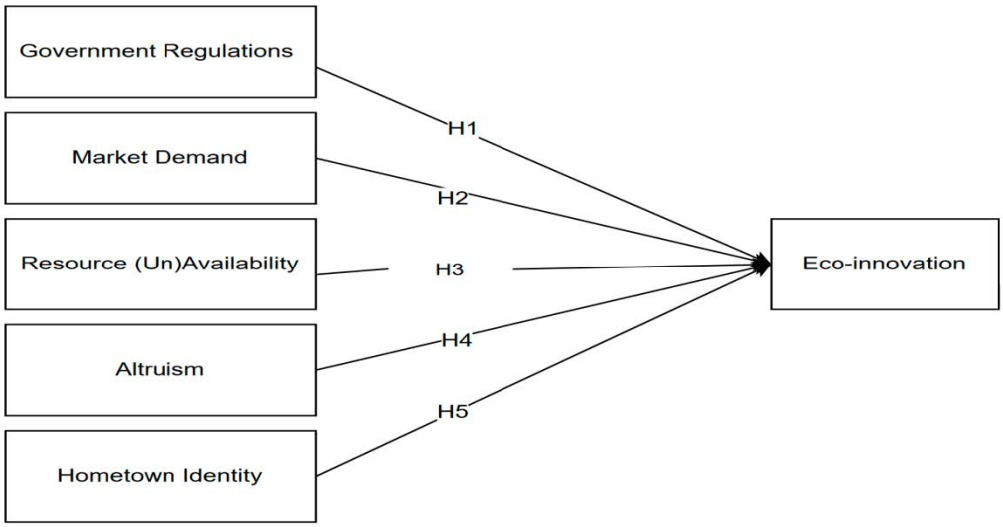

Figure 1. Conceptual frameworks of eco-innovation drivers. Source: previous literature [16,36].

3. Methodology

3.1. Specificities of Ghana

The theoretical literature does not make it possible to understand what may be the mechanisms that further motivate local firms in the informal sector to introduce environmental innovations. Ghana seems to be a good field of analysis to try to answer these questions because eco-entrepreneurship is preponderant there, and this type of study among informal firms has never been carried out. Indeed, during the last decade, Ghana has hosted several local eco-innovation awards competitions for informal and formal SMEs. Its entrepreneurs have participated and won multiple international distinctions on eco-innovation such as SEED awards [107]. As a result, SMEs currently offers better prospects for eco-innovation and are an engine of employment and growth. In this context, recycling services and related activities are among the most innovative sectors, even though they lag behind their European counterparts.

Ghana's strategy for eco-innovation follows the approval, in 2010, of the National Environmental Sanitation Policy and the National Environmental Sanitation Strategy and Action Plan (NESSAP) 2010. One of the operational variations of this strategy is the action plan in favor of the renewable energy act (Act832), created to promote renewable energy, attract investments, open access to transmission lines and renewable energy funds. Moreover, the Ghana National Climate Change Policy of 2013 covers a wide range of activities promoting (1) effective adaptation, (2) social development, (3) mitigation, and involves taking eco-technologies from the research stage to commercialization. According to Anthony Mensah, the Director of Sanitation at the Ministry of Sanitation and Water Resources, 80% of eco-innovation in Ghana is now delivered by the private sector [20]. In Ghana, these action plans aimed to develop and promote eco-technologies in certain promising sectors of activity by improving the productivity of natural resources and reducing environmental impacts on the one hand, and by developing the field of eco-technologies, as a branch of diversification of the Ghanaian economy, on the other hand. This plan takes into consideration sectoral differences and aims to support eco-innovative SMEs because of their weight in the economic fabric. Therefore, it is important to understand the nature of these sectoral differences in terms of incentives for eco-innovation.

3.2. Sample and Data

Given that the data on informal firms and their activities are rare, we used as area-based frame the data from the World Bank's Ghana Informal Surveys (GIFS) conducted in 2016. GIFS divided five urban centers, namely Accra, Tema, Takoradi, Kumassi, and Tamale, into 180 zones. Zones created in the GIFS were estimated appropriate to use

and were also found to offer research design advantages, thereby helping to minimize errors. However, although the GIFS survey aimed at providing information on the level of informal activity and reasons for informality, thus lacking eco-innovation information, it helped us to distinguish between formal and informal firms among those which were selected for EU–Ghana circular economy competition and those present at the Ghana waste fair 2021.

The second round of sampling involved 'canvassing' each SME present at the 2021 Ghana waste fair and asking screening questions such as the company's registration status. With the available owners/care-takers identified, we conducted a face-to-face survey based on a standard semi-structured questionnaire covering a variety of issues such as enterprise registration status, sales, cost, business environment, labor, registration, eco- innovation activities, etc., as recommended by [17].

A total of 412 founders, co-founders, and other care-takers were surveyed, representing 56.5% of the target population of the 729 firms originally selected in the GIFS. Of these 412 respondents, 285 questionnaires were valid, including 66% in manufacturing and 34% in the service industry. This distribution of sectors clearly reflects the specific nature of the Ghanaian's economy, which is to be oriented towards manufacturing. In the informal sector, 100% of the sample is made up of small businesses with 1 to 49 employees.

3.3. Variables and Descriptive Statistics

3.3.1. Dependent Variables

The environmental innovation variables were both defined according to the type and the purpose following some questions derived from previous initiatives including the NEPAD's African Science [108], Technology, and Innovation Indicator (ASTII) survey [109]; the World Bank's Ghana Informal Surveys (GIFS); and the World Intellectual Property Organization (WIPO) study [110]. It is important to remember that innovations are not taken here in an exclusive dimension. A firm may have introduced either only one type of innovation or a type of innovation coupled with another type. Depending on the type of environmental innovation, three variables are defined as including eco-product innovation, eco-process innovation, and eco-service innovation. These three dependent variables are binary, taking the value 1 if the company declares itself as having introduced at least one eco-innovation and 0 otherwise. The eco-product innovation was selected in function of the fact that the product has generated at least one of the environmental benefits resulting from the production of goods and services such as (1) lower consumption of materials, (2) lower energy consumption, (3) lower CO footprint, (4) the use of less polluting materials, (5) less pollution of soil, water, air, or sound, or (6) the recycling of waste, wastewater, or materials used or benefits generated after the sale of a good or service to the final consumer and its use by the latter, such as (7) less energy consumption, (8) less pollution of soil, water, "air or noise" or (9) better recycling of the product after use. As for process eco-innovation, this variable consists of the introduction of a production process that has generated at least one of the environmental benefits mentioned above. Finally, eco-innovation service is defined as the introduction of a service that has generated at least one of the environmental benefits mentioned above. Table 1 shows some of the product, process, and service eco-innovations introduced by businesses, indicating that the majority of the innovations brought by the selected firms were new-to-business.

3.3.2. Independent Variables

Five groups of drivers of eco-innovation are considered according to the hypotheses formulated previously. On a 5-point Likert scale, these dependent variables were rated (1 = "strongly disagree", 5 = "strongly agree"). Government regulations and market demand were assessed using three items, each from Agan et al.'s [111] study. Some of the items that measured market demand were "Environmental issues are important to our customers"; "Concerning environmental issues, our customers make requirements". Related to government regulations the items were framed as "Environmental regulations

subsidies or public financing encourage us to eco-innovate"; "Environmental regulations encourage our firm to invest in the environmental efforts". The resource (un)availability measurement was adopted from Kiefer [112], and some of the items were labeled as "What degree of average use do your physical resources have?", "During the process of development/adoption of this eco-innovation, has your firm experienced any restriction in the (un)availability of physical resources (materials, labs and devices)"? Related to altruism, Hartmann et al.'s [95] four items were used to assess altruism construct. The questions sample for this construct included "Doing eco-friendly company ventures/initiatives provides me a wonderful feeling of personal pleasure". Finally, hometown identity was assessed with three items. Some of the items were "What has been the main motivation for developing/adopting this eco-innovation?".

Table 1. Eco-innovation of informal sector in Ghana.

Type of Innovation	Description of Main Innovative Activity
Product	
Goods	Making of 'stuffing' chairs with local products New material to produce 'kente' cloth (Recycling) Making of new flip-flops for funerals (Used tires) Using electronic spare parts to produce wall clock new designs to furniture and clothing (Recycling) Introduction of a new washing powder
Services	Vulgarizing services Remote and home maintenance Introduction of home services Car alarm services House roofing services Phone repair services Mobile money payment methods
Process	Introduction of new machines—carving machines, sterilizer, embroidery machine, bead polishing machine, etc. Software to keep inventory and records of clients Delivery methods—new methods to order 'materials', office delivery, text messages, etc.

4. Data Analysis and Findings

4.1. Profile of Respondents

The statistical approach began with the standard assessment for missing values and normality of the acquired data. The missing values were examined with SPSS, and the data entry was validated against the original data at random to confirm correctness. Table 2 summarizes the characteristics of the respondents. Out of the 285 SME founders, co-founders, and care-takers who participated in the survey, 58.6 percent were male, while 41.4 percent were female. The average age of the responders is somewhere between 30 and 50 years old. A diploma degree was indicated by 31.2 percent of the respondents. Over half of the respondents had between 5 and 20 years of job experience. According to the statistics, 71.6 percent of the participats live and work in their hometown. In various industries, 40.24 percent of these businesses have been in existence for more than 5 years.

Continuous average values of each latent constructs were computed from their Likert scale responses using the transform command to assessed intra construct correlation. We used Smart PLS 3 to evaluate our suggested model using structural equation modeling. Table 3 illustrates the descriptive statistics, which are the mean and standard deviation of all the measured constructs.

Table 2. Sample characteristic (n = 285).

Variables	Category	Frequency	Percentages
Gender	Male	167	58.6
	Female	118	41.4
Age	Below 20	21	7.4
	20–29	27	9.5
	30–39	76	26.7
	40–49	120	42.1
	50 above	41	14.4
Educational Level	Diploma	89	31.2
	Bachelor's Degree	69	24.2
	Masters	28	9.8
	Vocational	56	19.6
	Others	43	15.0
Live in Hometown	Yes	204	71.6
	No	81	28.4

Table 3. Descriptive statistics of constructs.

Latent Variables	Mean	Standard Deviation
Government Regulations (REGU)	3.899	0.7895
Market Demand (MKD)	3.356	1.0369
Resource Availability	3.279	0.6215
Altruism	2.947	0.8942
Hometown Identity (HID)	3.317	0.6215
Eco-Innovation Performance (ECOIN)	3.706	0.9634

4.2. Preliminary Analysis

Confirmatory factor analysis (CFA) was performed to assess the construct's convergent and discriminant validity. CFA is a statistical method for determining the relevance of measurement variables and the items that measure them [113]. CFA aids in measuring the fit between the theory-based proposed model and the data, which are operationalized by one or more goodness-of-fit indices before testing the hypotheses [114]. Table 4 shows that the Cronbach's coefficient and composite reliability of the constructs were both above the minimum requirement of 0.6 [$\alpha > 0.6$], indicating consistency in their attempt to measure the same thing. Furthermore, convergent validity was determined by computing average variance extracted (AVE) and composite reliability (CR), and their values are above the minimum thresholds [AVE > 0.5, CR > 0.7] followed Fornell and Larcker's [115] recommendations. This indicates that the items measure the amount of variance that is captured by the constructs in relation to the amount of variance due to measurement error. Again, the square root of all constructs' extracted average variance was higher than the inter-correlations coefficients, indicating that the divergent validity of constructs have been achieved [115].

Furthermore, the hetero-trait–mono-trait (HTMT) ratio was used as an alternate method of determining discriminant validity. According to Franke et al. [115], the HTMT ration of correlation criterion is robust as an estimator of the deattenuated (perfect reliable) correlation between constructs. The HTMT ratio was measured in the range of 0.391 to 0.730 for all constructions. As a result, none of the HTMT ratios exceeded Henseler's proposed threshold limit of 0.90.

Table 4. Factor loadings (λ), Reliability (α) and Convergent Validity of Drivers Eco-innovation.

Constructs	Numbers of Items	α	λ	CR	AVE
Government regulations	3	0.895	0.945 0.944 0.811	0.928	0.813
Market demands	3	0.871	0.937 0.915 0.761	0.906	0.874
Resource availability	3	0.710	0.781 0.759 0.736	0.758	0.587
Altruism	4	0.963	0.960 0.954 0.942 0.881	0.9651	0873
Hometown	3	0.717	0.800 0.709 0.623	0.755	0.510

4.3. Structure Model

To evaluate the postulated direct association, we used the bootstrapping approach with 1562 resamples to assess the accuracy of the estimates. The bootstrapping approach is a fairly simple alternative method of testing a hypothesis as it mitigates some pitfalls encountered within the traditional approach. The suggested structural model's fit indices are listed in Table 5. According to Kyriazos et al. [116], all CFAs model fit values must meet the recommended criteria, with a goodness-of-fit index (GFI) equal to or above 0.95; adjusted goodness-of-fit (AGFI) equal or above 0.90; Tucker–Lewis index (TLI) equal or above 0.95; incremental fit index (IFI) equal or above 0.95; normed fit index (NFI) equal or above 0.95; and root mean square error of approximation (RMSEA) equal or below 0.08. The parameter estimates for the hypothesized connections are shown in Table 6. For each hypothesis, we present the standardized coefficients and their significance. At the 0.05 significance level one-tailed test, all hypotheses were supported.

Table 5. Model fitness indices.

Fitness Indices	First Order Confirmatory	Second Order Confirmatory
GFI	0.692	0.914
NFI	0.811	0.924
RFI	0.784	0.901
IFI	0.834	0.943
TLI	0.810	0.933
CFI	0.834	0.943
RMSEA	0.102	0.052

Related to the hypothesized direct effect, we found a positive and significant link between government regulations in Ghana and the local firm eco-innovation performance (β_{Uns} = 0.312 **; p-value = 0.000 < 0.05) in the informal sectors, thereby accepting Hypothesis 1. This finding is in line with previous results of drivers of eco-innovation [36,38]. In addition, consistent with previous findings [9,23], market demand has a positive effect on Ghanaian SMES eco-innovation performance (β_{Uns} = 0.208 **; p-value = 0.022 < 0.05) with a statistical significance, thereby supporting Hypothesis 2. Hypothesis 5 is also accepted because hometown identity has a positive effect on Ghanaian eco-innovation performance

(β_{Uns}= 0.148 **; p-value = 0.009 < 0.05) and is statistically significant at 5% significance in the one-tailed test.

Table 6. Parameter estimation for proposed model.

Variables (Constructs)	β_{Uns}	β_s	*SE*	*CR*	*p*-Value	Remarks
Eco-innovation Performance ← Regulations	0.312 **	0.230 **	0.079	3.928	0.000	Accepted
Eco-innovation Performance ← Market Demand	0.208 **	0.156 *	0.091	2.298	0.022	Accepted
Eco-innovation Performance ← Resource Availability	0.067	0.038	0.11	0.612	0.541	Rejected
Eco-innovation Performance ← Altruism	−0.09	−0.078	0.061	−1.468	0.142	Rejected
Eco-innovation Performance ← Hometown Identity	0.148 **	0.149 **	0.057	2.596	0.009	Accepted

Note: β_{Uns} = unstandardized beta coefficient, and β_s = standardized beta. * $p < 0.05$, ** $p < 0.01$.

5. Discussion

Over the past few decades, eco-innovation has become a major concern of both public and private formal and informal sectors. The main challenges of eco-innovations are not only to improve the environmental performance, but also to promote the competitiveness of firms, which is necessary for economic growth. The objective of this article was to analyze the determinants that motivate firms to implement this form of alternative solution between economic growth and sustainable development in the informal sector. This study has made it possible to highlight the lack of research at the level of SMEs and the question of motivations for eco-innovation at the informal sector, including both the service sector and the manufacturing industry. In addition, many studies have focused on the determinants of eco-innovations within firms in industrial countries, while only a few elements are known concerning developing countries. Thus, it is important to better understand drivers to environmental innovation for a country such as Ghana with predominant SMEs in the informal sector.

In general, firms engage in environmental innovation for reasons that are often close to those of innovation in the broad sense. That is to say, for similar reasons, regardless of the impact of the innovation on the environment. Nevertheless, it appears that reasons related to the specific characteristics of eco-innovations also favor their introduction. Indeed, this study validates three hypotheses specific to the determinants of environmental innovations, namely the incentive role of government measures, market pressures, and the entrepreneur's hometown identity. However, altruism value and resource availability were not retained as drivers in our samples.

5.1. Theoritical and Practical Contributions

First, the current results allow us to make research proposals about the importance of the entrepreneurs' vision and values on the intensity of commitment to environmental innovation. The hometown identity characteristic of the entrepreneurs influences the perception of external pressures and those of internal resources. SME entrepreneurs that consider eco-innovation as social obligation for their community tend to be more active than those who invest solely to comply with regulations [27,117]. For the Ghanaian informal sector, environmental innovation activities are an integral part of their development because they are in line with the beliefs of entrepreneurs; moreover, and above all, they have significant economic benefits for firms [44,46]. Therefore, changing the behavior of entrepreneurs with regard to sustainable development could have positive consequences on the development of SMEs and their impact. This could be accomplished through training and the use of cases that illustrate best practices as well as the challenges that are proposed. Engagement in eco-innovation should also be seen as an iterative process that would build on the current capabilities of SMEs and a long-term vision to evolve according to available resources [118].

Second, three theories used in the research are complementary; however, they differ in their objectives and levels of analysis. While resource and entrepreneurial approach theories are primarily instrumental, stakeholder theory is also normative in scope. The entrepreneur-manager could thus be considered as the "glue" which makes it possible to articulate and firmly bring together the two approaches [119]. With regard to the objectives of the actors and their modes of decision-making, differences are also to be noted, since, if the theory of the stakeholders is situated at the relational level, the theory of the approach by the resources favors rationality and (limited) actors, and entrepreneurial theory combines rationality and emotion. Thus, the approach of analyzing the determinants of eco-innovation as a social and cognitive construction that underlies our developments allows us to overcome this divide.

Third, results reveal differences in the perception of the role played by the regulatory pressures anticipated by SMEs in the informal sector. The regulations positively influence the introduction of environmental innovations, which validate the hypothesis H1. Industries in Ghana are sensitive to it, which is similar to the results of the work of Rennings [66], Leitão et al. [79], and Christoph [112], which reveal the particular importance of regulations and public policies vis-à-vis environmental innovation. This result could partly confirm Porter's hypothesis, namely that the introduction of regulations to reduce harmful impacts on the environment improves environmental performance. Indeed, it is quite possible that some industries, with regard to their activities, are more constrained by regulations than others. For instance, Leitão et al. [79] found that public policy has a more positive influence on high-tech firms as compared to lower-tech firms. Nevertheless, within the framework of this study, the distinction between a firm's level of technological intensity was not established, which is why the validation across firm type cannot be verified.

Finally, an important result highlights the role of demand, which clearly appears as a major determinant regardless of the sector of activity, the type, or the nature of eco-innovation. This result is consistent with the vision of Schmookler [83] for innovation and with that of Horbach [85] and Leitão et al. [79] for eco-innovations. These authors believe that the market characteristics and demand are determining factors in their introduction. These results reveal that entrepreneurs in the informal sectors are sensitive to the preferences of their customers. When they take these expectations into account, they are more likely to introduce an innovation that will benefit their customers. Thus, it would seem that these firms innovate to defend their competitiveness in response to opportunities linked to the still-recent nature of this market. In view of this finding, it could be effective to raise consumer awareness on environmental issues, particularly on their own consumption, to encourage them to consume responsibly. The education system, associations, or in-company training could, for example, take on part of this mission of public interest.

5.2. Limitations

In general, this analysis has made it possible to highlight the importance of taking into consideration inter- and intra-sectoral specificities when it comes to dealing with the question of motivations for eco-innovation at the company level. Indeed, at the end of this analysis, it was clearly identified that the reasons related to the introduction of environmental innovations can be of a different nature according to the sector of activity.

However, other factors should also be distinguished to refine the analysis of these determinants. For example, being able to measure the ecological impact of innovation beyond its simple introduction would make it possible to measure its effect on the environment. Similarly, being able to evaluate the variation in economic performance before the introduction (period t-1) and after this effective implementation (period t) could make it possible to test Porter's hypothesis and to thus know whether or not these alternatives are effective from both an economic and ecological point of view. This is why, in the context of any subsequent research, a dynamic analysis may be favorable for a better interpretation of this phenomenon. On the other hand, it would be interesting to compare this type of work

with others that are relatively similar, albeit concerning other geographical, economic, or regulatory areas. Such a comparison would make it possible to better take into account national specificities, and thus identify certain trends that would make scientific interpretations more robust. Finally, a profile of respondents to make an advanced correlation with age, sex, level of education, in order to justify its presence and to create a better understanding of the influence, internally, in terms of these factors on the eco-innovation process, can be further investigated.

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