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Submitted 02-02-2023. Approved 11-13-2023

Evaluated through a double-anonymized peer review. *Ad hoc* Associate Editor: Bedanand Upadhaya

The reviewers did not authorize disclosure of their identity and peer review report.

Original version | DOI: <http://dx.doi.org/10.1590/S0034-759020240203>

ECOPRENEURIAL BEHAVIOR IN A PANDEMIC CONTEXT

Comportamento ecoempreendedor no contexto pandêmico

Comportamiento ecoempreendedor en contexto de pandemia

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ABSTRACT

In this study, we examined ecopreneurial behavior in the COVID-19 context by analyzing the influence of moral obligation and environmental engagement on the perception of empathy, ecopreneurial self-efficacy, and environmental value creation. Primary data was collected from 130 Atlantic Forest Connection Project participants. Data analysis was performed using PLS-SEM. Six of eight hypotheses were supported. Our study confirmed that empathy and self-efficacy perception are influenced by higher moral obligation levels. Results also indicate that more environmentally engaged ecopreneurs have higher levels of self-efficacy and environmental value creation. On the other hand, the premise that a feeling of morality could positively impact environmental value creation arising from the business was contradicted. Similarly, the hypothesis that environmental engagement positively influences ecopreneurial empathy has not been confirmed. Thus, we advanced on ecopreneurship by opening a new research direction for testing the explanatory power of variables that have not been tested so far. The research also offers practical insights for policymakers and educators involved with ecopreneurship. In the same way, we shed light on farmers and agriculture. Additionally, we present contributions directly related to the UN Sustainable Development Goals (SDG) Agenda.

Keywords: ecopreneurship, sustainability, developing country, pandemic, sustainable development goals.

RESUMO

O presente estudo explora o comportamento ecoempreendedor no contexto da Covid-19, analisando a influência da obrigação moral e do engajamento ambiental na percepção de empatia, autoeficácia ecoempreendedora e criação de valor ambiental. Dados primários foram coletados de 130 participantes do Projeto Conexão Mata Atlântica. A análise dos dados foi realizada usando o PLS-SEM. Seis das oito hipóteses de pesquisa foram suportadas. O estudo confirmou que a percepção de empatia e autoeficácia é influenciada por níveis mais elevados de obrigação moral. Os resultados indicam que os ecoempreendedores mais engajados com o meio ambiente têm níveis mais altos de autoeficácia e criação de valor ambiental. Foi contrariada a premissa de que um sentimento de moralidade poderia impactar positivamente a criação de valor ambiental decorrente do negócio. A hipótese de que o engajamento ambiental influencia positivamente a empatia ecoempreendedora não foi confirmada. Os resultados demonstram a complexidade das relações entre as variáveis que medem o comportamento ecoempreendedor e a necessidade de explorar esses determinantes de características-chave. Assim, a pesquisa representa um avanço na temática do ecoempreendedorismo, abrindo-se uma nova direção para investigações ao testar o poder explicativo de variáveis até então não testadas. Ela também oferece percepções práticas para formuladores de políticas e educadores envolvidos com o ecoempreendedorismo. Por fim, fazemos algumas reflexões à luz dos produtores rurais e das atividades rurais. Além disso, apresentamos contribuições diretamente relacionadas à Agenda dos Objetivos de Desenvolvimento Sustentável (ODS) da ONU.

Palavras-chaves: ecoempreendedorismo, sustentabilidade, país em desenvolvimento, pandemia, objetivos de desenvolvimento sustentável.

RESUMEN

En este estudio exploramos el comportamiento ecoempreendedor en el contexto de la COVID-19 analizando la influencia de la obligación moral y el compromiso ambiental en la percepción de empatía, autoeficacia ecoempreendedora y creación de valor ecológico. Los datos primarios se recolectaron de 130 participantes del Proyecto de Conexión del bosque Atlántico. El análisis de los datos se realizó mediante el PLS-SEM. Seis de las ocho hipótesis de la investigación fueron respaldadas. Nuestro estudio confirmó que la percepción de empatía y autoeficacia está influenciada por niveles más altos de obligación moral. Los resultados indican que los ecoempreendedores más comprometidos con el medio ambiente tienen niveles más altos de autoeficacia y creación de valor ecológico. Se contradijo la premisa de que un sentimiento de moralidad podría impactar positivamente en la creación de valor ecológico proveniente del negocio. La hipótesis de que el compromiso ambiental influya positivamente en la empatía ecoempreendedora no ha sido confirmada. El estudio demuestra la complejidad de las relaciones entre las variables que miden el comportamiento ecoempreendedor y la necesidad de explorar estos determinantes de características clave. Por lo tanto, avanzamos en el tema del ecoemprendimiento abriendo una nueva dirección de investigación al probar el poder explicativo de variables hasta ahora no probadas. La investigación también ofrece conocimientos prácticos para los formuladores de políticas y los educadores relacionados con el espíritu empresarial ecológico. Asimismo, hacemos algunas consideraciones sobre los productores y las actividades rurales. Además, presentamos contribuciones directamente relacionadas con la Agenda de los Objetivos de Desarrollo Sostenible (ODS) de la ONU.

Palabras clave: espíritu ecoempreendedor, sostenibilidad, país en desarrollo, pandemia, objetivos de desarrollo sostenible.

INTRODUCTION

The COVID-19 pandemic has caused an unprecedented distress and brought unexpected societal transformations (Sharma et al., 2022). The global health concern imposed a substantial economic crisis due to social distancing measures imposed by most countries, which has brought to the fore several needs, such as adaptation to a new digital reality, reorganization of the supply chain, and new ways of retaining customers (Tampakoudis et al., 2021).

At the height of the pandemic, consumers experienced significant changes in their purchasing behaviors. A new approach to health was characterized by the interdependence of human and environmental health (Tanveer et al., 2020). People have become more selective concerning what they buy or consume while becoming more attentive to consuming certain harmful products to health or the environment (Bawakyillenuo & Agbelie, 2021). Coincidentally, environmental awareness has recently increased in society at all levels (Alwakid et al., 2021), causing an increase in demand for environmentally friendly products and, consequently, strengthening a green market (Gupta & Dharwal, 2022).

The COVID-19 pandemic and the increase in consumers' environmental awareness have brought business opportunities for entrepreneurs willing to improve the environment (Bawakyillenuo & Agbelie, 2021; Galindo-Martín et al., 2021). In this context, ecopreneurship has emerged as a new front for entrepreneurship, combining it with environmentalism in order to advance toward an ecological society (Bawakyillenuo & Agbelie, 2021).

Similarly, since their ratification by the United Nations in 2015, the Sustainable Development Goals (SDGs) have become the predominant global framework for addressing societal progress toward sustainable prosperity. In the meantime, entrepreneurial activities have been advocated as potential solutions to environmental and social problems (Dhahri et al., 2021).

In a general definition, ecopreneurship has the same basic characteristics as entrepreneurial activity combined with the entrepreneurs' initiative through social and environmental innovation for sustainability and prioritization of skills in these dimensions (Alwakid et al., 2021; Dhahri et al., 2021; Gupta & Dharwal, 2022). It is more closely related to the sustainable development perspective and extends business gains to non-financial desires (Soomro et al., 2020) associated with environmental and societal needs (Bawakyillenuo & Agbelie, 2021).

The basic characteristics of an entrepreneur usually include self-efficacy, risk propensity, planning, recognition of opportunities, and persistence. In the case of sustainability-oriented entrepreneurial subtypes, much is said about empathy, moral obligation, and environmental engagement (Hockerts, 2017; Kaida & Kaida, 2019; Prado et al., 2022). Regarding ecopreneurs, research has shown that they are problem solvers who can apply innovation and critical thinking to face challenges (Bawakyillenuo & Agbelie, 2021) but simultaneously depend on a motivation to put their ideas into practice (Dhahri et al., 2021). This fact calls for further studies on this theme since there is a consensus that entrepreneurship is an essential catalyst in job creation and country development (Audretsch et al., 2023), and sustainable entrepreneurship modalities are conduits to achieving sustainable development goals.

As discussed above, the pandemic context also sheds light on market opportunities around more environmentally friendly goods and services. This has increased the launch of ventures focused on the environmental sphere (Dabbous et al., 2023; Manoj et al., 2020; Severo et al., 2021). However, to encourage ecopreneurship, it is essential to understand their characteristics, behaviors, and motivations, which are still at an early stage of investigation by academics (Yasir et al., 2023). These facts provide an exciting research field to investigate ecopreneurship, which can increase wealth and economic efficiency in a developing country (Annamdevula et al., 2023; Hoogendoorn et al., 2020).

Amid such contextualization, we intend to answer the following research question: *How does moral obligation and environmental engagement influence empathy, self-efficacy, and the creation of ecological value in eco-enterprises?* More specifically, the study aims to examine the ecopreneurial behavior in the context of the COVID-19 pandemic by analyzing the influence of moral obligation and environmental engagement – which are behavioral antecedents driven by this disruptive context – on the perception of empathy, ecopreneurial self-efficacy, and creation of ecological value.

This study rests upon three primary assumptions, contributing to the context of entrepreneurship and social and environmental sustainability concerns in Brazil. *First*, it acknowledges the crucial role of sustainability-focused entrepreneurship in attaining sustainable development and advancing the SDG Agenda (Dhahri et al., 2021; Gurău & Dana, 2018; Rodríguez-García et al., 2019). In other words, this study emphasizes the significance of ecopreneurship as an emerging field of research since this area has demanded further exploration into the role of entrepreneurial activities in fostering both economic and non-economic benefits for investors and society at large, as demonstrated in the work of Alwakid et al. (2021). *Second*, there is a gap in understanding how entrepreneurship and entrepreneurs have supported social change driven by the pandemic, and this study tries to deepen the understanding of this phenomenon (Sharma et al., 2022). *Third*, in emerging markets such as Brazil, there is a certain sensitivity to environmental issues and an effort to combine them with green entrepreneurship (Alwakid et al., 2021), as this entrepreneurial subtype is proven to bring economic growth and environmental improvement (Gupta & Dharwal, 2022). Our results contribute to a deeper understanding of the factors that drive ecopreneurial values and behaviors, which can support public and private programs and investments to strengthen sustainable development in the Brazilian context. We also call attention to our sample, which is composed of farmers, who are considered catalysts in implementing sustainable practices in rural areas by offering sustainable products. Thus, this article is original since it applies an empirical model that analyzes the effects of entrepreneurial characteristics on each other, which has not been previously proposed in the literature. Thus, our conceptual model does not follow a conventional approach.

LITERATURE REVIEW

Ecopreneurship and sustainable development

Sustainable development encompasses social, environmental, and economic sustainability goals and is considered a driving force behind various economic policies, contributing to a country's long-term competitiveness based on its social and economic development (Dabbous et al., 2023). In response to the growing concerns about environmental degradation and its visibility, entrepreneurs received a mandate from policymakers and society to offer their contribution to sustainable social goals through equally sustainable entrepreneurial activities (Audretsch et al., 2023). Entrepreneurship, recognized as a dynamic source of economic growth, job creation, and innovation, plays a pivotal role in optimizing available resources to create both economic and social value (Zhao et al., 2023).

When aligned with sustainable development goals, entrepreneurs are seen as agents to foster a more socially and environmentally friendly society (Antolin-Lopez et al., 2019). Sustainable entrepreneurs, also referred to as ecopreneurs, are considered key solutions to address global challenges (Audretsch et al., 2023; Dabbous et al., 2023; Hoogendoorn et al., 2020; Xu et al., 2022; Yasir et al., 2023). They ecopreneurs focus on life support, community, and nature preservation, aiming to generate economic and non-economic gains for individuals, the economy, and society (Xu et al., 2022). Their endeavors contribute to the sustainability of individual organizations and to economic and societal sectors in general (Yasir et al., 2023).

Ecopreneurship, as a subset of sustainable entrepreneurship, emphasizes integrating environmental degradation solutions into business activities (Gupta & Dharwal, 2022; Soomro et al., 2020; Sun et al., 2020). The term “ecopreneurship” is derived from the combination of “eco,” pertaining to ecology, and “entrepreneurship” (Rodríguez-García et al., 2019). Researchers have introduced various terms such as environmental entrepreneurship, green entrepreneurship, grassroots ecological entrepreneurs, and ecological entrepreneurship to describe entrepreneurial activities oriented toward environmental protection (Antolin-Lopez et al., 2019; Bawakyillenuo & Agbelie, 2021; Juma et al., 2023).

Ecopreneurs play a crucial role in conducting business activities that do not harm people and the environment. Their characteristics are shaped by personal and historical experiences, including temporal orientation, future perspectives, recognizing evolving opportunities, and setting ambitious goals (Alwakid et al., 2021; Gurău & Dana, 2018). These ecopreneurs can be defined by their environmental and economic goals, striving to achieve profitable outcomes while promoting green values and environmental market opportunities (Antolin-Lopez et al., 2019; Hoogendoorn et al., 2020).

Concerning the various types of sustainability-oriented entrepreneurs, research supports the presence of several key characteristics among those who engage in business activities to promote sustainable development. These characteristics include empathy, moral obligation, self-efficacy, perception of social support (Hockerts, 2017), and environmental engagement (Kaida &

Kaida, 2019). In this study, our primary focus will be on exploring empathy, ecopreneurial self-efficacy, and the capacity to generate environmental value within eco-enterprises and examining how these perspectives are influenced by the moral obligation and environmental engagement of ecopreneurs.

Empathy, defined as the capacity to understand and respond to others' mental states and emotions, is highly present in social entrepreneurs and plays a significant role in predicting social entrepreneurial intentions (Kim, 2022; Tan et al., 2021). In the context of ecopreneurship, empathy combines with environmental concern to drive sustainable practices (Gupta & Dharwal, 2022).

Ecopreneurs' self-efficacy, reflecting their belief in achieving specific goals and tasks, has been associated with entrepreneurial effectiveness and pro-environmental behaviors (Soomro et al., 2020). Sustainability-oriented entrepreneurs with higher self-efficacy are better equipped to pursue environmentally responsible objectives (Hockerts, 2017; Kim, 2022).

Finally, ecopreneurship embraces green technologies, products, services, and processes that promote value creation while reducing resource consumption and pollution compared to traditional production methods. Scholars emphasize that ecopreneurial activities offer opportunities for reducing environmental pollution and fostering sustainable economic growth (Sun et al., 2020). The concept of environmental value creation has emerged, advocating value creation for a wider range of stakeholders beyond the narrow scope of profit maximization (Prado et al., 2022; Rodríguez-García et al., 2019). The creation of ecological value involves innovative environmental management practices and clean production mechanisms for environmental businesses (Prado et al., 2022; Yi, 2021).

Hypotheses development and empirical model

According to the existent literature, especially due to the recurrent rise of debates dealing with socio-environmental issues, companies have felt pressured to rearrange their business activities to provide value in three dimensions: economic, social, and environmental (Rodríguez-García et al., 2019). In this context, moral obligation refers to the idea that the individual feels pressured to take some action in the face of a problem (Hockerts, 2017).

Based on Tan et al. (2021), moral obligations entail a perception that social norms dictate a responsibility to assist marginalized communities and contribute solutions that, at the very least, do not exacerbate the problem of ongoing environmental degradation (Kaiser & Byrka, 2011; Prado et al., 2022). As a result, similar to empathy, moral obligation steers individuals toward actions that prioritize social outcomes over mere profitability. Consequently, these social norms instill confidence in individuals to adopt a sustainability-oriented approach (Tan et al., 2021).

Previous research has used moral obligation as an antecedent to the intention of social entrepreneurship (Hockerts, 2017), create ecological value (Prado et al., 2022), and as one of the factors that affect actions to mitigate climate change (Leviston & Walker, 2021). Ecopreneurs are

morally obligated to think about the future and play an active role in environmental change (Gregori et al., 2021; Jayashankar et al., 2018).

The issue of moral obligation in the context of the COVID-19 pandemic is particularly interesting. For Tanveer et al. (2020), the health approach and the environmental health emphasized due to the pandemic are characterized by the interdependence of humans and animals, an interdependence that gained special importance in this critical moment and fostered ecopreneurial perspectives. According to Tampakoudis et al. (2021) and Leviston and Walker (2021), such perspectives also emerged as a moral obligation resulting from the increase in business revenues during the pandemic.

Research conducted by Razzak and Riyami (2023) suggests that people with significant levels of empathy act with kindness toward the environment and society as a whole because their attitude is influenced by their sense of moral obligation. Similarly, Shuqair et al. (2022) found moral obligation results in more generous attitudes, such as being willing to help others. In this context, we expect that the high level of moral obligation of ecopreneurs will have a direct impact on their levels of empathy toward nature and community. Thus, our first research hypothesis (H1) was created:

H1: Moral obligation positively influences empathy.

Moral obligation can also influence an individual to implement a practice (Ogiemwonyi & Jan, 2023; Razzak & Riyami, 2023), as Annamdevula et al. (2023) demonstrated when proving that moral obligation is an antecedent of the behavioral intention of recycling. According to Tan et al. (2021), moral obligation is necessary to raise awareness of the desire to establish sustainability-oriented companies. Previous studies have reported that moral obligation influences entrepreneurial self-efficacy. In other words, an entrepreneurial moral motivation to help others triggers a cognitive appraisal of whether they are capable and have enough support to contribute to an environmental purpose, which subsequently influences their decision to create an environmental venture (Ukil et al., 2023). In such context, we highlight our second research hypothesis (H2):

H2: Moral obligation positively influences ecopreneurial self-efficacy.

In the environmental domain, moral obligation also includes the responsibility toward the value a venture can create for the community. More specifically, the feeling of guilt can boost a caring attitude (Razzak & Riyami, 2023; Shuqair et al., 2022). According to Ogiemwonyi and Jan (2023), moral obligation reflects ethical choices that are based on the core character of good citizenship, fairness, and responsibility. This sense of moral obligation also impacts individuals' attitudes toward green consumption and practices. In the context of our research, we expect that ecopreneurs with high levels of moral obligation also have high levels of environmental value creation. Hence, our third research hypothesis (H3) can be presented:

H3: Moral obligation positively influences environmental value creation.

Aside from personal moral obligation, environmental engagement is another predictor of ecopreneurial behavior (Kaiser & Byrka, 2011). It involves an individual's commitment to ecological practices, including the consumption of goods and natural resources, and their knowledge about environmental issues and potential solutions (Piyapong, 2020).

Thus, engagement is a distinctive factor composed of components related to cognition, emotion, and behavior linked to the individual's performance. According to Piyapong (2020), engaging in environmental behaviors contributes to mitigating the environmental damage caused by society.

Many studies have detected environmental engagement as an impacting factor in sustainable development (Bawakyillenuo & Agbelie, 2021; Kaiser & Byrka, 2011; Piyapong, 2020). Some studies also associate environmental engagement with education issues (Bawakyillenuo & Agbelie, 2021). Concerning ecopreneurship, the study by Gu and Wang (2022) found that environmentally conscious entrepreneurs pay more attention to ecological issues in their production and management decisions.

Researchers also approach environmental engagements a result of individuals' environmental values (Annamdevula et al., 2023; Bouman et al., 2020; Yeow & Loo, 2022). Several previous studies have reported that environmental values are associated with individuals' pro-environmental engagement (Bouman et al., 2020; Manoj et al., 2020). Yasir et al. (2023) found that environmental values such as universalism, altruism, and empathy characterize the selfless actions of individuals that lead them to enthusiastically protect their local ecosystem and their fellow humans. Aligned with these authors, we predict that environmentally engaged ecopreneurs have higher levels of empathy toward nature and society. Thus, our fourth research hypothesis (H4) is presented:

H4: Environmental engagement positively influences empathy.

Environmental engagement also relates to the individuals' political engagement, which may promote or sustain a venture. In this case, environmental engagement supports entrepreneurs in keeping their environmental goals (To et al., 2020). Moreover, environmentally engaged entrepreneurs have better levels of self-efficacy and are less concerned with uncertainties and irregularities (To et al., 2020). Based on these arguments, we propose our fifth research hypothesis (H5):

H5: Environmental engagement positively influences ecopreneurial self-efficacy.

Finally, as already discussed, environmental engagement has some relation to individual environmental values. In research conducted by Xu et al. (2022), the authors noted that environmental engagement can affect the level of a venture in engaging in sustainable

activities that create value beyond the economic sphere. This means that the implementation of environmental value creation depends on the entrepreneurial interpretation of sustainability issues as a market opportunity or as an environmental threat. In this context, our last research hypothesis, H6, concerns the influence of ecopreneurs' environmental engagement on environmental value creation:

H6: Environmental engagement positively influences environmental value creation.

Based on our six hypotheses, the conceptual model is shown in Figure 1.

The conceptual model was adapted from [Hockerts \(2017\)](#) (Figure 1). We propose a new configuration to assess the influence of moral obligation and environmental engagement on the perception of empathy, ecopreneurial self-efficacy, and environmental value creation. Furthermore, the Environmental Engagement construct was added based on [Kaida and Kaida \(2019\)](#).

The measurement items were adapted as follows: ecopreneurial self-efficacy, empathy, and moral obligations were adapted from [Hockerts \(2017\)](#), while environmental value creation was based on [Bojica et al. \(2018\)](#) and [Domenico et al. \(2010\)](#). Finally, environmental engagement items were adapted from [Kaida and Kaida \(2019\)](#).

METHODOLOGICAL APPROACH

This is an applied research adopting a quantitative approach. Data analysis and treatment were supported by multivariate data analysis, specifically through Confirmatory Factor Analysis (CFA) and Partial Least Squares Structural Equation Modeling (PLS-SEM).

CFA refers to the measurement quality of each construct. This technique tests the representativeness of each variable of the construct in the same way that it allows confirming the degree of adjustment of the observed data to the hypothesized theory ([Hair et al., 2019](#)). Structural Equation Modeling (SEM) can simultaneously analyze multiple measurements on objects of study, and assess the quality of the measurement and testing relationships between latent variables, that is, phenomena not directly observable ([Hair et al., 2019](#)).

In this study, SEM was developed with Partial Least Squares (PLS) estimation, which usually uses diagrams to illustrate a hypothetical path model that visually displays the theoretical relationships between the variables ([Manley et al., 2021](#)). Thus, PLS-SEM is commonly used to model complex relationships with multiple dependent and independent relationships between latent variables to identify degrees of prediction and explanation of the presented constructs ([Hair et al., 2019](#)).

According to [Manley et al. \(2021\)](#), researchers in the field of entrepreneurship commonly use this technique to assess relationships between multiple variables, typically measured with

more than one item, characterizing an approach that goes beyond the precepts of multiple regression. Therefore, the use of PLS-SEM is adequate to measure the antecedents of the dependent variables “Empathy,” “Ecopreneurial Self-Efficacy,” and “Environmental Value Creation” proposed in this study.

The study examined ecopreneurs participating in the Atlantic Forest Connection Project. This is a Project led by the Brazilian Federal Government, carried out in Rio de Janeiro, São Paulo, and Minas Gerais and aimed to promote the conservation of biodiversity and water and combat climate change (*Infraestrutura e Meio Ambiente*, 2020). The Atlantic Forest biome is globally recognized and highly important for harboring a great diversity of flora and fauna. As a result, programs to restore the original Atlantic Forest biodiversity have been created.

The Atlantic Forest Connection Project participants are examples of ecopreneurs. According to Sun et al. (2020), ecopreneurs help curb global warming, reduce deforestation and environmental degradation, maintain biodiversity, and improve water supply and agricultural practices.

Primary data collection was conducted in the field through a questionnaire utilizing a five-point Likert scale, from 1 (I strongly disagree) to 5 (I totally agree). The measurement instrument was submitted to the Ethics Committee of the University. A pre-test was conducted with ten specialists in methods, concepts, and technical aspects. As a result of the pre-test, it was possible to identify conceptual, structural, and scale doubts, and adaptations were made so that the instrument had the least possible dubiousness. Furthermore, the questions extracted from the literature review were translated into Portuguese and adapted during validation.

The questionnaire was administered by agricultural technicians from the BioSistêmico Institute (IBS) under our supervision and support. They visited rural properties to apply the questionnaires, and we held weekly meetings with them to monitor and align the progress of the data collection. Participants were selected randomly, and this process occurred from January to April 2021.

Regarding sample adequacy, the GPower 3.1 software pointed out a minimum sample size of 92 for the 359 farmers participating in the Atlantic Forest Connection Project. We obtained 130 respondents (approximately 40% of the participants), so the sample was considered adequate to conduct PLS-SEM (Hair et al., 2019).

RESULTS

The data analysis was performed in four stages. First, descriptive statistics were used to understand the profile of the object of study. Regarding gender, 78% of respondents were male and 22% were female, with an average age of 56 years, 80% of whom were married. The monthly family income was between BRL 3,134.41 and BRL 6,601.06. Of the total sample, 33% had completed high school. Table 1 highlights the descriptive statistics of the survey participants.

Table 1. Sample Descriptive Statistics

Characteristics		%
Gender	Female	21.67
	Male	78.33
Age	< 30 years old	2.36
	31 – 60 years old	62.99
	61 years old +	34.65
Education	Illiterate	0.79
	Incomplete primary education	6.30
	Complete primary education	8.66
	Incomplete high school	11.81
	Complete high school	33.07
	Incomplete higher education	11.81
	Complete high education	17.32
Complete graduate	10.24	
Marital status	Single	11.72
	Married	80.47
	Divorced	5.47
	Other marital status	2.34
Monthly family income	Up to BRL 1,045.00	4.65
	From BRL 1,045.01 to BRL 2,089.60	17.05
	From BRL 2,089.61 to BRL 3,134.40	25.58
	From BRL 3,134.41 to BRL 6,601.06	28.68
	From BRL 6,101.07 to BRL 10,448.00	23.26
	Above BRL 10,448.01	0.78

After the descriptive analysis, the empirical stage of the study was carried out, which began with the evaluation of the measures included in the conceptual model. Hair et al. (2019) recommend analyzing convergent validity, discriminant validity, and reliability, as all constructs are reflexive. Thus, Table 2 presents CFA results and the descriptive analysis of the indicators, indicating the excluded questions. Table 3 presents the indicators for the suggested analyses, demonstrating that all values are within those indicated by Hair et al. (2019).

Table 2. CFA and Descriptive Analysis of the Measurement Model

Questions	Standardized path loading	Mean	Standard Deviation	T-value	P-value	Source
Ecopreneurial Self-Efficacy						
ESE1. I am convinced that I can contribute to facing social and environmental challenges (problems) if I dedicate myself to it.	0.812	0.811	0.036	22.634	0.000	Adapted from Hockerts (2017)
ESE2. I can find a way to help solve society's social and environmental problems.	0.871	0.870	0.025	35.438	0.000	
ESE3. Solving social and environmental problems is something I can contribute to.	0.837	0.836	0.029	28.958	0.000	
ESE4. I feel prepared to work in an eco-company.	0.899	0.897	0.022	41.381	0.000	
ESE5. I feel able to work in a company to contribute to environmental value creation.	0.903	0.901	0.021	42.564	0.000	
Environmental Value Creation						
EVC1. In my eco-company, we create new products, processes, services, or business models that did not exist.	0.791	0.789	0.058	13.601	0.000	Adapted from Domenico et al. (2010)
EVC2. In my eco-company, we use discarded, disused or unwanted resources for new purposes.	0.861	0.860	0.043	20.006	0.000	
EVC3. In my eco-company, we use untapped resources that other organizations fail to recognize, value or use.	0.878	0.877	0.036	24.165	0.000	
EVC4. In my eco-company, we adapt, rearrange and improvise materials as necessary.	0.928	0.927	0.027	34.346	0.000	
EVC5. We are confident in our ability to find viable solutions to new challenges using our existing resources.	0.916	0.914	0.026	34.785	0.000	

Continue

Table 2. CFA and Descriptive Analysis of the Measurement Model

Questions	Standardized path loading	Mean	Standard Deviation	T-value	P-value	Source
EVC6. We use any existing resource that seems useful to respond to a new problem or opportunity.	0.900	0.900	0.031	29.152	0.000	Adapted from Bojica et al. (2018)
EVC7. We address new challenges by combining existing resources and other resources available to us cost-effectively.	0.958	0.957	0.011	86.863	0.000	
EVC8. When dealing with new problems or opportunities, we act in an environmentally sound manner, assuming that we will find a viable solution.	0.928	0.927	0.019	48.654	0.000	
EVC9. When combining our existing capabilities, we meet a surprising variety of new challenges.	0.935	0.934	0.020	46.408	0.000	
EVC10. When facing new challenges, we create viable solutions from our existing resources	0.921	0.921	0.027	33.994	0.000	
Environmental Engagement						
ENG1. When shopping I take my own bag and avoid using plastic bags provided by stores.	0.701	0.697	0.056	12.510	0.000	Adapted from Kaida and Kaida (2019)
ENG2. I often turn off the faucet to conserve water (excluded).	0.452	-	-	-	-	
ENG3. I turn off the lights that are not in use (excluded).	0.512	-	-	-	-	
ENG4. Whenever possible, I prefer to buy refills over new products.	0.805	0.804	0.036	22.205	0.000	
ENG5. When possible, I prefer to use public transport over a private car (excluded).	0.272	-	-	-	-	
ENG6. I avoid wasting food (excluded)	0.330	-	-	-	-	
ENG7. I choose to buy environmentally friendly (sustainable) products.	0.817	0.814	0.044	18.457	0.000	
ENG8. I recycle waste at home.	0.596	0.592	0.077	7.710	0.000	
ENG9. I dispose of waste properly in public places.	0.747	0.745	0.043	17.531	0.000	

Continue

Table 2. CFA and Descriptive Analysis of the Measurement Model

Concludes

Questions	Standardized path loading	Mean	Standard Deviation	T-value	P-value	Source
Empathy						
EMP1. I try to put myself in the shoes of socially disadvantaged people.	0.828	0.822	0.052	15.811	0.000	Adapted from Hockerts (2017)
EMP2. Seeing socially disadvantaged people triggers an emotional response in me.	0.888	0.880	0.044	20.198	0.000	
EMP3. I feel compassion for socially disadvantaged people.	0.901	0.896	0.039	23.262	0.000	
EMP4. I am willing to fight to further social equality.	0.909	0.909	0.038	24.215	0.000	
Moral Obligation						
MOB1. It is an ethical responsibility to help people less fortunate than us.	0.806	0.807	0.040	19.933	0.000	Adapted from Hockerts (2017)
MOB2. We are morally obliged to help socially disadvantaged people.	0.903	0.900	0.027	33.529	0.000	
MOB3. Social justice requires us to help those who are less fortunate than us.	0.936	0.936	0.013	71.409	0.000	
MOB4. It is one of the principles of our society to help socially disadvantaged people.	0.865	0.864	0.034	25.237	0.000	

Table 3. Constructs' Reliability and Validity

Construct	ESE	EVC	EMP	ENG	MOB
Ecopreneurial Self-Efficacy	0.865				
Environmental Value Creation	0.628	0.903			
Empathy	0.557	0.328	0.884		
Environmental Engagement	0.515	0.572	0.301	0.738	
Moral Obligation	0.593	0.356	0.731	0.443	0.880
Cronbach's Alpha	0.916	0.974	0.907	0.787	0.901
Composite Reliability	0.937	0.978	0.935	0.855	0.932
Average Variance Extracted	0.748	0.815	0.782	0.544	0.774

Additionally, to perform the common method bias analysis, we used three questions that were unrelated to the study and were inserted into the questionnaire. No significant correlation values were found between the dependent and control variables, indicating the absence or little influence of common method bias in this study (Podsakoff et al., 2003).

The fourth and last step of the empirical analysis validates the measurement model and comprises the validation of the structural model. At this stage, Hair et al. (2019) recommend analyzing collinearity, structural and determination coefficients, and predictive relevance. Collinearity was analyzed using the Variance Inflation Factor (VIF), where all relationships showed values of 1,244 within the established range. Table 4 presents the Student's T-tests and P-values.

Table 4. Structural Model Analysis Indicators

Hypothesis	Mean	Standard deviation	Path coefficient	T-value	P-value	Effect size (f^2)	Significant at 5%?
MOB → EMP	0.749	0.052	0.743	14.282	0.000	0.952	Yes
MOB → ESE	0.451	0.065	0.454	6.951	0.000	0.291	Yes
MOB → EVC	0.122	0.074	0.127	1.708	0.088	0.020	No
ENG → EMP	-0.025	0.061	-0.030	0.496	0.620	0.002	No
ENG → ESE	0.322	0.065	0.314	4.866	0.000	0.140	Yes
ENG → EVC	0.520	0.100	0.516	5.148	0.000	0.325	Yes

Table 4 summarizes the results of the research hypotheses. They indicate that moral obligation influences empathy and ecopreneurial self-efficacy, just as environmental engagement influences ecopreneurial self-efficacy and environmental value creation, thus supporting hypotheses H1, H2, H5, and H6. However, the same results indicate that moral obligation does not influence the creation of ecological value and environmental engagement does not influence empathy, thus rejecting hypotheses H3 and H4.

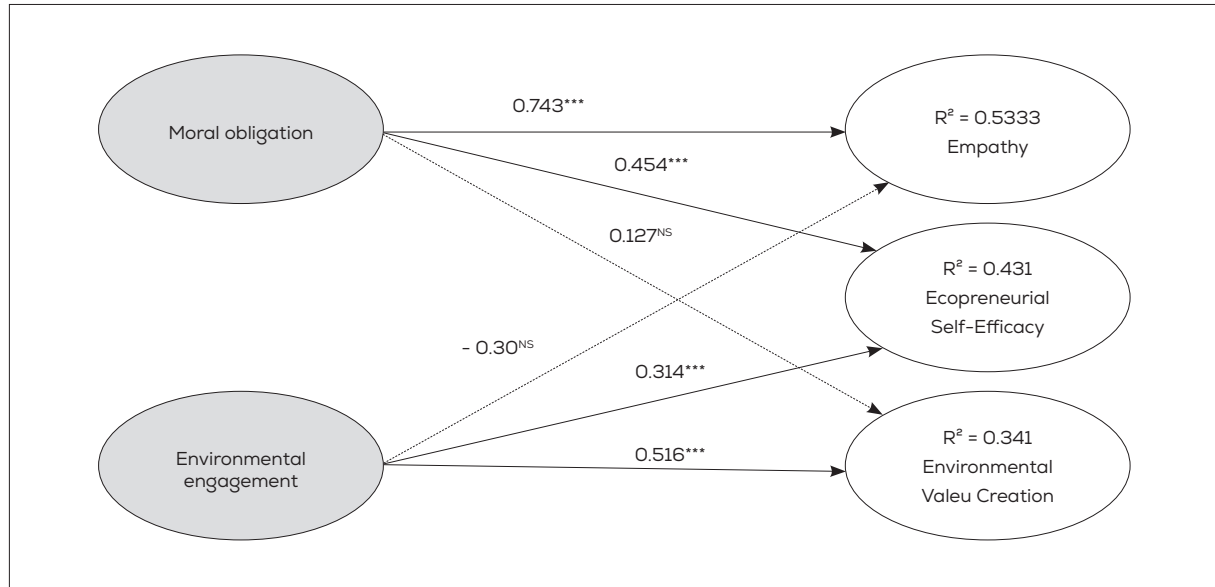
After examining the significance of the relationships, the next step concerns the assessment of the model's accuracy (Hair et al., 2019). Table 5 presents the R^2 , the adjusted R^2 , a modified version of the R^2 for the model predictors, and the Q^2 values.

Table 5. Coefficient of Determination and Predictive Relevance

Construct	R^2	R^2 Adjusted	Q^2
Ecopreneurial Self-Efficacy	0.431	0.422	0.315
Environmental Value Creation	0.341	0.330	0.274
Empathy	0.533	0.526	0.409

Table 5 shows that all R^2 values are large and are explained by moral obligation and environmental engagement. Q^2 values are also within the recommendations of Hair et al. (2019). Figure 1 presents the conceptual model analysis indicators.

Figure 1. Conceptual Model



Note: * = significant at 5%; ** = significant at 1%; *** = significant at 0.1%; NS = Not Significant.

To strengthen the results obtained, we performed moderation tests with two control variables: age and experience as an entrepreneur. According to the results presented in Table 5, no moderation effect was identified in relationships, considering age and experience as an entrepreneur.

Table 6. Moderation Tests with Control Variables

Relationship	Mean	Standard Deviation	T-value	P-value
Moderating Effect AGE - MOB → EMP	-0.003	0.074	0.186	0.853
Moderating Effect AGE - ENG → EMP	0.075	0.062	1190,000	0.234
Moderating Effect AGE - MOB → ESE	0.020	0.123	0.073	0.942
Moderating Effect AGE - ENG → ESE	-0.081	0.091	0.751	0.453
Moderating Effect AGE - MOB → EVC	0.029	0.090	0.115	0.909
Moderating Effect AGE - ENG → EVC	-0.016	0.089	0.176	0.860
Moderating Effect EXPERIENCE - MOB → EMP	0.119	0.115	1.129	0.259

Continue

Table 6. Moderation Tests with Control Variables

Concludes

Relationship	Mean	Standard Deviation	T-value	P-value
Moderating Effect EXPERIENCE - ENG → EMP	-0.038	0.096	0.530	0.596
Moderating Effect EXPERIENCE - MOB → ESE	-0.041	0.070	0.684	0.494
Moderating Effect EXPERIENCE - ENG → ESE	-0.016	0.082	0.183	0.854
Moderating Effect EXPERIENCE - MOB → EVC	0.060	0.068	0.780	0.436
Moderating Effect EXPERIENCE - ENG → EVC	0.054	0.101	0.394	0.693

DISCUSSIONS

To achieve sustainable development, businesses that harm the environment must be gradually adjusted. The COVID-19 pandemic presented an opportunity and incentive to enhance sustainable production and consumption practices (Galindo-Martín et al., 2021). This study aims to analyze the influence of moral obligation and environmental engagement on empathy, ecopreneurial self-efficacy, and the creation of ecological value among Brazilian ecopreneurs during the pandemic. The empirical findings shed light on the behavioral changes in this entrepreneurial subtype, providing valuable insights for public and private managers to develop strategies that promote socio-environmental aspects in the entrepreneurial sphere.

The study confirmed that higher levels of moral obligation positively influence empathy and self-efficacy among ecopreneurs, supporting H1 and H2. This indicates that ecopreneurs feel a greater responsibility to aid socially disadvantaged individuals and contribute to environmental preservation (Kaiser & Byrka, 2011; Prado et al., 2022). This result corroborates Tanveer et al. (2020) and Leviston and Walker (2021), who argue that the COVID-19 pandemic has shifted societal norms, leading individuals to exhibit greater morality in disruptive circumstances. Moreover, these results are consistent with prior research demonstrating that moral obligation fosters environmental and community kindness (Razzak & Riyami, 2023; Shuqair et al., 2022) and drives the implementation of environmentally friendly ventures (Annamdevula et al., 2023; Ogiemwonyi & Jan, 2023; Tan et al., 2021; Ukil et al., 2023).

On the other hand, the premise that a sense of morality could positively influence the creation of ecological value within businesses was contradicted, as H3 was not supported. It is possible that the COVID-19 pandemic alerted entrepreneurs to the importance of delivering products that go beyond economic considerations and have socio-environmental impacts. However, the effects of such value creation may not yet be perceived as a moral obligation, given that it requires innovation and cleaner production processes (Yi, 2021). Consequently, the pandemic's impact on ecopreneurial responsibility in this context remains to be fully realized.

Furthermore, the study's findings show that environmentally engaged ecopreneurs exhibit higher levels of self-efficacy and are more involved in environmental value creation, supporting H5 and H6. This suggests that individuals who actively participate in environmental activism feel equipped to implement environmental policies and strategies within their work environment (Piyapong, 2020). In other words, a heightened awareness of socio-environmental issues leads to greater responsiveness to such demands. This aligns with previous studies by Alwakid et al. (2021) and Gu and Wang (2022).

Our findings suggest that environmental engagement influences environmental values, so individuals maintain market offers that encompass pro-environmental goals and activities (To et al., 2020; Xu et al., 2022), which is a phenomenon related to the positive effect of environmental engagement on ecopreneurial self-efficacy and environmental value creation. Thus, we can affirm that environmental values are essential for an ecopreneurship model establishing solutions for cleaner production and technical processes (Yasir et al., 2023). It also influences the ecopreneur's capacity to identify opportunities and incentivizes green innovation (Hoogendoorn et al., 2020).

However, the hypothesis that environmental engagement positively influences ecopreneurial empathy (H4) was not supported. This finding may be explained by the fact that empathy is a predictor usually attributed to social entrepreneurs (Hockerts, 2017; Kim, 2022) and little addressed in studies on ecopreneurship.

The rejection of two effects of our empirical model, moral obligation on environmental value creation and environmental engagement on empathy, can also be attributed to our sample selection. In this study, we focused on rural producers, and the entrepreneurship modality focused on the environment. Hence, rural producers may not see their activity as a catalyst for environmental value creation (Manoj et al., 2020). In addition, they may not perceive community demands toward their activities associated with sustainability (Bouman et al., 2020). Similarly, rural producers' engagement with the environment may be limited to ecology, and environmental engagement is not related to empathy toward society (Yeow & Loo, 2022). As a consequence, our empirical results are limited to the environmental sphere, excluding the relation of ecopreneurship with social issues.

Implications and contributions

The validation of the findings is relevant, as the sample is composed of effective ecopreneurs who were investigated during COVID-19, which suggests that the contributions are feasible and focus on four main points. *First*, this study validates a robust theoretical model with high explanatory power for the dependent variables (namely, empathy, ecopreneurial self-efficacy, and environmental value creation), which helps understand ecopreneurial behavior. It is important to note that we validated the measurement and the structural model, testing normality, reliability, and internal consistency, like previous studies (Severo et al., 2021). Thus, we bring relevant insights into ecopreneurial behavior at a time when the world is trending toward a

sustainable economy (Dhahri et al., 2021; Gur u & Dana, 2018; Rodríguez-García et al., 2019). In addition, we proposed a combination of effects of variables typically used as mediators and moderators, like moral obligation and environmental engagement. As a result, we advanced on ecopreneurship by opening a new research direction for testing the explanatory power of variables that have not been tested so far when it comes to ecopreneurial behavior (Annamdevula et al., 2023; Hoogendoorn et al., 2020).

Second, this study demonstrates the complexity of the relationships between variables that measure ecopreneurial behavior and the need to examine the determinants of these key characteristics. The results indicate that empathy and self-efficacy, predictors of entrepreneurial intention established in the literature (Kim, 2022), can be leveraged when the entrepreneur has high levels of moral obligation. Likewise, entrepreneurs who are environmentally engaged enhance self-efficacy and value creation. Thus, reordering and testing new interactions and effects of entrepreneurial characteristics and perspectives is possible, like observed in the study by Leviston and Walker (2021), which tested the indirect effect of individual effectiveness on pro-environmental behavior through moral engagement (although not in a disruptive scenario such as the Covid-19 pandemic).

Third, this study offers practical insights for policymakers and educators involved with ecopreneurship. Policymakers must develop an environment that promotes empathy, self-efficacy, and environmental value creation. Additionally, reinforcing the importance of moral obligation and encouraging pro-environmental behavior can boost perceptions of empathy, self-efficacy, and environmental value creation. In addition, programs to raise awareness help potential ecopreneurs by increasing their aspirations for success and providing significant support. It is worth noting that by showing the economic benefits of being more ecological and ecologically correct, ecopreneurs work as an attraction, encouraging other companies to be ecologically proactive (Galindo-Martín et al., 2021; Rodríguez-García et al., 2019). Furthermore, this research confirms that ecopreneurs have entrepreneurial characteristics similar to business entrepreneurs, such as self-efficacy. At the same time, they have characteristics observed also in social entrepreneurs, especially regarding empathy and moral obligation. Thus, evaluating and developing behavior aimed at the sustainability of potential entrepreneurs can be an appropriate development strategy to increase the number of ecopreneurs (Tan et al., 2021).

Fourth, regarding rural producers, our findings propose that sustainable farming can be boosted by ecopreneurs who are influenced by the sense of moral obligation toward the community as a whole and environmental engagement. The COVID-19 pandemic increased the safe-food needs and called for innovative approaches to address issues related to the environment, human health, and fair trade in agribusiness (Lang et al., 2022). It also demonstrates that the agricultural sector can play an essential role in addressing many of the global challenges and that there is a market opportunity for field activities (Barth et al., 2021). Especially in our research context, promoting business development and sustainability as a common goal through farming can impact the local community development as a whole (Barth et al., 2021).

Finally, this research presents contributions directly related to the SDGs Agenda. Especially in the environmental dimension, the results corroborate SDG 13 (climate action) regarding

the adoption of urgent measures to combat climate change and its impacts; SDG 14 (life below water), regarding the conservation and sustainable use of oceans, seas, and marine resources for sustainable development; and SDG 15 (life on land), referring to the protection, restoration, and promotion of the sustainable use of terrestrial ecosystems, sustainable generation of forests, combating desertification, halting and reversing soil degradation, and halting the loss of biodiversity. On the economic front, it is possible to contribute to SDG 8, which advocates inclusive and sustainable economic growth with decent work for employees, and SDG 12, which indicates sustainable patterns of consumption and production.

CONCLUDING REMARKS

This research presented an unprecedented model of Brazilian ecopreneurs' behavior, whose data were collected amid the COVID-19 pandemic. Through a symmetric analysis conducted by the Structural Equation Modeling technique, we identified that the disruptive scenario caused by the pandemic boosted ecopreneurs to feel more morally obliged to respond to the consumer market with greater empathy and self-efficacy as they become more environmentally engaged and, consequently, with a greater perception of ecopreneurial self-efficacy and creation of ecological value in their businesses.

The obtained outcome reveals a notable transformation in ecopreneurial perspectives due to COVID-19. This indicates that despite certain challenges in sustainability-oriented entrepreneurial practices, particularly related to the lack of basic sanitation in certain regions (Alwakid et al., 2021; Tanveer et al., 2020), both consumers and entrepreneurs in emerging economies are increasingly inclined to embrace behaviors that foster sustainable development.

In other words, understanding that empathy, ecopreneurial self-efficacy, and the creation of ecological value can be even more expressive when the individual feels morally obliged to respond to the current socio-environmental challenges, as well as to refrain from more environmentally engaged behaviors, encourages managers and policymakers to work toward strengthening the significant role that ecological entrepreneurs play in society, especially in countries whose regulations do not favor entrepreneurship.

Despite the methodological rigor, this study has limitations. First, the study proposes and validates a model that still needs a theoretical basis, making it difficult to analyze the results precisely because the literature that supports ecopreneurship still needs to be expanded. Second, the model is composed of the interaction of only five constructs. Third, the sample is limited to a Brazilian governmental project.

Based on our limitations, future studies are encouraged to add other factors that strengthen empathy, self-efficacy, and environmental value creation in the empirical model. We also call for studies that include other subtypes of sustainability-oriented entrepreneurship, and new samples, other periods, and places.

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ACKNOWLEDGEMENTS

The authors express their gratitude to the National Council for Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico [CNPq]) 001 303924/2021-7 and the São Paulo Research Foundation (Fundação de Amparo à Pesquisa do Estado de São Paulo [Fapesp]) 2021/08267-2 for supporting the research.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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