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THE PERCEPTION OF BRAZILIANS ON THE SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND THE LOW-CARBON ECONOMY

[1]Rossana Parizotto Ribeiro
[2]Ana Lígia Gil Espuny
[3]Andrea Burmeister Morais Hermes
[4]Elaine Marisa Andriolli

ABSTRACT

Objective: The objective of this study is to analyze the significance of Sustainable Development Goals (SDGs) in the context of the Low Carbon Economy (LCE) through a quantitative and descriptive approach. The research aims to identify and understand the relationships between the 17 SDGs and their impact on the promotion of sustainable development, particularly in mitigating climate change-related issues.

Method: The research employed a quantitative and descriptive methodology, utilizing a survey conducted in the state of Rio Grande do Sul (RS), Brazil. The survey was designed to gather data from respondents representing civil society, government, and companies in the region. Participants were asked to evaluate the importance and influence of each of the 17 SDGs on the Low Carbon Economy.

Results: The research findings reveal substantial relationships between the 17 Sustainable Development Goals (SDGs) and the Low Carbon Economy (LCE), as perceived by the respondents. The results indicate that all SDGs play a significant role in influencing the LCE. These findings emphasize the interconnectedness of sustainable development goals and their potential to drive the transition to a Low Carbon Economy.

Conclusions: The study highlights the crucial role of Sustainable Development Goals in promoting a Low Carbon Economy. By fostering the use of renewable energy sources and sustainable practices, the LCE offers a solution to reduce environmental damage and work towards achieving sustainable development. The 2030 Agenda, comprising the 17 SDGs, serves as a global framework that necessitates collaborative efforts from civil society, governments, and businesses in the 193 signatory countries to address pressing global challenges, especially those related to climate change.

Keywords: Sustainable development, Low Carbon Economy, Sustainable actions, Global issues

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1 Doutoranda em Administração pela Universidade do Vale dos Sinos (UNISINOS), Rio Grande do Sul (Brasil). **Email:** rparizottor@gmail.com **Orcid:** https://orcid.org/0000-0002-8007-1735

2 Doutoranda pela Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre (PUCRS), Brasil. **Email:** analigiagilespuny@yahoo.com.br **Orcid:** https://orcid.org/0000-0003-1189-8154

3 Mestranda do curso de Administração da Universidade do Vale do Rio dos Sinos (Unisinos). **Email:** andreamoraishermes@gmail.com **Orcid**: https://orcid.org/0000-0002-3398-0530

4 Mestrado em Administração pela Universidade Federal do Rio Grande do Sul (UFRGS), Rio Grande do Sul (Brasil). **Email:** elainemarisa@hotmail.com **Orcid:** https://orcid.org/0000-0003-0663-0209

A PERCEPÇÃO DOS BRASILEIROS SOBRE OS OBJETIVOS DE DESENVOLVIMENTO SUSTENTÁVEL (ODS) E A ECONOMIA DE BAIXO CARBONO

RESUMO

Objetivo: O objetivo deste estudo é analisar a relevância dos Objetivos de Desenvolvimento Sustentável (ODS) no contexto da Economia de Baixo Carbono (EBC) por meio de uma abordagem quantitativa e descritiva. A pesquisa visa identificar e compreender as relações entre os 17 ODS e seu impacto na promoção do desenvolvimento sustentável, particularmente na mitigação de questões relacionadas às mudanças climáticas.

Método: A pesquisa empregou uma metodologia quantitativa e descritiva, utilizando uma pesquisa realizada no estado do Rio Grande do Sul (RS), Brasil. A pesquisa foi projetada para coletar dados de respondentes representando a sociedade civil, o governo e empresas da região. Os participantes foram solicitados a avaliar a importância e a influência de cada um dos 17 ODS na Economia de Baixo Carbono.

Resultados: Os resultados da pesquisa revelam relações significativas entre os 17 Objetivos de Desenvolvimento Sustentável (ODS) e a Economia de Baixo Carbono (EBC), conforme percebido pelos respondentes. Os resultados indicam que todos os ODS desempenham um papel importante na influência da EBC. Essas descobertas enfatizam a interconexão entre os objetivos de desenvolvimento sustentável e seu potencial para impulsionar a transição para uma Economia de Baixo Carbono.

Conclusões: O estudo destaca o papel crucial dos Objetivos de Desenvolvimento Sustentável na promoção de uma Economia de Baixo Carbono. Ao fomentar o uso de fontes de energia renováveis e práticas sustentáveis, a EBC oferece uma solução para reduzir danos ambientais e trabalhar para alcançar o desenvolvimento sustentável. A Agenda 2030, composta pelos 17 ODS, serve como um quadro global que exige esforços colaborativos da sociedade civil, governos e empresas dos 193 países signatários para enfrentar desafios globais urgentes, especialmente aqueles relacionados às mudanças climáticas.

Palavras-chave: Desenvolvimento sustentável, Economia de Baixo Carbono, Ações sustentáveis, Problemas globais

1. INTRODUCTION

Although different thinkers, theorists and academics have tried to consolidate the understanding of sustainable development since the 1980s, it is still under construction and has different biases. However, in general, it can be considered that sustainable development is systemic, being able to meet the needs of the current generation, without compromising the ability to meet the needs of future generations.

Thus, given this understanding, our planet over many years, especially after the Second Industrial Revolution, has leveraged extremely polluting production systems that generate toxic gases and cause serious damage to the environment and, consequently, to us human beings. Greenhouse gases (GHG) quickly contaminate Planet Earth, generating not only global warming, but other contaminations that are harmful to our health and, perhaps, irreversible. One of the alternatives for us to reduce global warming rates is the Low Carbon Economy, which aims to use renewable energy sources, generating sustainable development.

In an attempt to combat the advances in environmental degradation and promote sustainable development, the United Nations Organizations, at the Rio +20 meeting in 2015, launched the ambitious Agenda 2030, comprising 17 Sustainable Development Goals, which called on the 193 member countries of the United Nations to meet 169 goals, with the motto: “leaving no one behind”. That is, countries, in their different actors, civil society, government and companies, must together engage in this challenge and develop sustainable actions in order to mitigate the impacts generated by the unbridled and inconsequential modern productive system and other global problems.

In view of the above, the study aims to analyze the relationships between the SDGs and the Low Carbon Economy from the perspective of Brazilians, responding to the following

problem: what are the relationships perceived by Brazilians between the SDGs and the Low Carbon Economy? To answer this question and the aforementioned objective, this article is structured in the following sections: i) literature review discussing the themes sustainable development and low-carbon economy; ii) methodology; iii) results and discussions; and, iv) final considerations.

2 THEORETICAL FRAMEWORK

2.1 Sustainable Development

The concept of sustainable development emerged at the World Commission on Environment and Development (WCED) in 1987, created by the United Nations to discuss and propose ways to harmonize economic development and environmental conservation, establishing that sustainable development is "the development capable of meeting the needs of the current generation without harming the ability of future generations to meet their needs" (Brundtland , 1987) .

The definition of sustainable development is not a state of harmony, but a process of change in which the exploitation of resources, the orientation of investments, the direction of technological development and institutional change are in line with current and future needs . The virtue of this definition is to highlight an ethical posture characterized by responsibility between the different generations (Brundtland , 1987).

Also, in the 1980s, Sachs (1986) formulated the basic principles of a new conception of development called, then, eco-development, being the satisfaction of the basic needs of the population; solidarity with future generations; participation of the population involved; preservation of natural resources and the environment; guarantee of employment, social security and respect for other cultures and education programs, understood in such a way that there was harmony between the listed areas (Sachs, 1986; Ribeiro et al., 2023).

For Sen (2000) sustainable development should be seen as a process of expanding substantive freedoms, not only individual, but social and economic, such as having access to health and education services, civil rights (of organization and participation), economic opportunities, etc. Therefore, development requires removing sources of deprivation of liberty: poverty and tyranny; lack of economic opportunities, neglect of public services. Since, for there to be development, it is necessary to have a balance between the economic, environmental and social dimensions (Sen , 2000).

In this perspective, the Sustainable Development Goals (SDGs) emerge, being the instruments for achieving full sustainable development, of a global nature, universally applicable, which dialogue with policies and actions at the regional and local levels and that local governments and managers are responsible for raising awareness and mobilizing people.

After Rio+20 (United Nations Conference on Sustainable Development, held in 2012 in the Brazilian city of Rio de Janeiro), a broad and inclusive consultation system was carried out on issues of global interest, in order to subsidize the construction of a post-2015 development agenda.

Supported by the tripod of sustainable development, which considers the social, environmental and economic dimensions in an integrated and indivisible way, reports such as "One Million Voices: the world we want" were produced, based on contributions from civil society, online research, recommendations from academics and scientists (CNM, 2017).

Based on these multiple contributions, a proposal was reached which, in September 2015, created the 2030 Agenda for Sustainable Development. The 2030 Agenda for Sustainable

Development, entitled "Transforming our World", was adopted during the United Nations Summit, in 2015, in New York, attended by representatives of 193 UN Member States, including the Brazilian nation, and determined 17 goals and 169 goals to be achieved by 2030 by these signatory countries (IPEA, 2018).

The Sustainable Development Goals (SDGs) are global proposals organized in the form of an agenda (Agenda 2030), which recognize weak points of importance for the continuity of humanity. The 2030 Agenda foresees global actions in the areas of eradicating poverty, food security, agriculture, health, education, gender equality, reducing inequalities, energy, water and sanitation, climate change, protection and sustainable use of oceans and terrestrial ecosystems, inclusive economic growth, among others, considering three main dimensions: Social, Environmental and Economic (IPEA, 2018).

By adopting the Agenda, countries committed to taking bold and transformative steps to advance sustainable development over the next 15 years, leaving no one behind. The 17 SDGs that make up the 2030 Agenda are integrated and indivisible and mix, in a balanced way, the three dimensions of sustainable development: economic, social and environmental (Ribeiro et al., 2023).

Figure 1 : Sustainable Development Goals

Source: United Nations (2018).

The SDGs are like a to-do list for governments, civil society, the private sector and all citizens on the collective journey to a sustainable 2030. The implementation of the 2030 Agenda, the SDGs and its targets will stimulate and support actions in areas of crucial importance for humanity: People, Planet, Prosperity, Peace and Partnerships, as can be summarized in Figure 2.

Figure 2 : Areas of Sustainable Development

Source: United Nations (2018).

The 2030 Agenda is an action plan to transform the world through actions developed by different actors and institutions. Such actions must be related to the five areas of importance (or 5 Ps) indicated. According to the Report of the Institute of Applied Economic Research-IPEA (2018) which presents the proposal to adapt the global goals of the SDGs to the Brazilian reality, the goals indicate the paths to be followed and the measures to be adopted to promote their achievement (IPEA, 2018).

2.2 Low Carbon Economy

One of the most discussed consequences of economic activity on the environment is climate change. At the beginning of the 21st century, empirical evidence intensified that human activity substantially increased the concentration of greenhouse gases (GHG) in the Earth's atmosphere.

Climate change is a long-term challenge, but one that requires urgent action (IPCC, 2013), as it occurs on a global scale, with almost irreversible consequences (Sprengel & Busch, 2011), causing environmental, economic and social damage, with physical and market risks for organizations (Dasaklis & Pappis , 2013) . The negative consequences expected from these changes include: rising temperatures, worsening droughts and floods, rising ocean levels and flooding of coastal areas, migration and extinction of animal and plant species and considerable changes in agricultural productivity (Parry et al., 2007), a major concern for companies, governments and the population .

According to studies released by the Intergovernmental Panel on Climate Change (IPCC), this decade will be decisive for us to adequately respond to the challenges posed by global warming. The Panel's reports point to the urgent need for countries, companies and societies to adopt consistent actions to reduce greenhouse gas emissions (IPCC, 2014).

As a result of the risks associated with these events, many countries have sought to plan strategies and policies focused on reducing GHG emissions, in search of a low-carbon economy. The Low Carbon Economy is a form of production that seeks to neutralize GHG emissions in the production process, making intensive use of technology and clean energy sources, generating greater social and economic benefits (Rubens Silva Filho, 2021). It is also based on the principle of compensation, where the polluting agent must acquire carbon credits generated by agents that use sustainable practices (according to the agreement signed between industrialized countries in the Kyoto protocol, in 1997). This system reduces the negative externalities of pollution, discourages polluting practices, protecting the environment and its biodiversity .

The growth of the low-carbon economy is related to the sustainable growth of the economy (Kondyli , 2010). A low-carbon economy is an economy based on low-carbon energy sources that therefore has a minimal output of GHG emissions into the biosphere, specifically referring to carbon dioxide (Reilly, 2012).

Environmental issues, especially global warming, are also of concern to Brazil, which has assumed a commitment to develop with sustainability, that is, using the resources available in nature, but without degrading it. Consolidated in 2009, at COP-15 (Conference of the Parties), the supreme body of the United Nations Conference on Climate Change, held in Copenhagen, the agreement was consolidated when the Brazilian government made a commitment to reduce GHG emissions by 36.1% to 38.9% by the year 2020 (Oliveira et al . , 2016) .

Brazil has enormous potential to act firmly in the search for a low-carbon economy. The Brazilian natural heritage has 62% of the national territory covered by native vegetation and the highest water availability in the world (12% of the planet's reserves). Its electrical energy

matrix has 85% of renewable sources. In addition, the country is the second largest producer of biofuels in the world.

3 METHODOLOGICAL PROCEDURES

The methodology used in this study is a quantitative and descriptive research, through a *Survey* applied in the state of Rio Grande do Sul (RS), with a view to analyzing the importance of the SDGs for the Low Carbon Economy.

According to Hair Jr. et al., (2013), quantitative research is a structured data collection model. According to Vergara (2009), descriptive research exposes characteristics of the investigated population, enabling correlations between variables, as well as serving as a basis for explaining phenomena. Accordingly, according to Malhotra et al., (2005), in quantitative research, the *Survey method* is the main method used in descriptive research, assuming itself as a survey of the universe of hundreds or thousands of elements (Malhotra , 2012).

In this context, with regard to the investigated population, the state of RS consists of an estimated population of 11,466,630 inhabitants (Brasil-IBGE, 2021). Therefore, the sample is characterized as non-probabilistic, for convenience (Hair Jr. et al. 2013). The initial sample consisted of 115 respondents. To this end, data collection was carried out in a snowball fashion, that is, through the researchers' contacts and social networks, where there was a greater coverage in the State of RS, from May to August 2022.

For data collection, a questionnaire with 60 questions was elaborated, where two questions are related to the understanding of what the SDGs and Low Carbon Economy are, three are questions related to age group, education and gender and 55 questions present statements through a five-point Likert scale, ranging from totally disagree to totally agree, being: i) 1 = Totally *disagree* ; ii) 2 = Partially Disagree; iii) 3 = Neither disagree nor agree; iv) 4 = Partially agree; and, v) 5 = I totally agree.

The questions that address the 17 Sustainable Development Goals (SDGs) were adapted from the study by Severo, Oliveira, De Guimarães (2019), and the questions that list the Low Carbon Economy were adapted from the research by Srivastav , Fankhauser and Kazaglis , (2018) . It is noteworthy that before application, the questionnaire was validated by two Researchers/Doctors *who were experts* in the thematic area studied.

4 RESULTS AND DISCUSSION

With regard to the identification of valid respondents in this survey in relation to gender distribution, 55.8% identify themselves as female, 41.6% as male and 1.8% as non-binary. Most respondents correspond to the age group of more than 46 years, being 31% of the respondents and the smallest corresponds to 1.8% being the age group of 15 to 20 years. Respondents in this survey showed 82.2% understanding of what the SDGs are and 84.1% understand what the Low Carbon Economy (LBE) is.

Before the process of validating the observable variables, the *Kaiser-Meyer- Olkin* (KMO) test of sample adequacy and Bartlett's Sphericity Test were performed, which indicate whether the variables are correlated, enabling the use of the factor analysis technique (Hair Jr. et al., 2013).

Table 1 highlights that the KMO has a value above 0.5 for all constructs, which indicates that factor analysis is an adequate technique for data analysis (Malhotra , 2012; Hair Jr. et al., 2013). Consistently, *Bartlett* 's Test of Sphericity was significant (p>0.001), indicating that there is a correlation between the variables, being suitable for the use of factor analysis.

To validate the research instrument, it was measured by calculating *Cronbach 's Alpha* , which presented a value of 0.982, thus demonstrating that the research instrument is reliable, according to Hair Jr. et al. (2010).

In this scenario, a simple reliability analysis was also carried out , through the calculation of *Cronbach 's Alpha* , which presented values higher than the recommended (0.70), which statistically validates the observable variables (Hair Jr. et al., 2013), a value very close to the recommended one, however, the KMO and *Bartlett 's Sphericity tests* were significant for the construct.

Table 1 - KMO, Bartlett's Sphericity and Cronbach 's Alpha Tests

Construct	**KMO**	**sphericity of Bartlett (Chisquare)**	***Cronbach 's alpha***
SDG1	0.695	124.091	0.822
SDG2	0.661	106,116	0.788
SDG3	0.661	154,403	0.828
SDG4	0.731	139,678	0.849
SDG5	0.791	161,273	0.858
SDG6	0.707	157,261	0.855
SDG7	0.721	195,302	0.818
SDG8	0.657	129,106	0.873
ODS9	0.719	173,262	0.852
SDG10	0.701	155,411	0.842
SDG11	0.726	134,050	0.743
SDG12	0.622	87,331	0.846
SDG13	0.673	155,335	0.912
SDG14	0.746	230,392	0.906
SDG15	0.725	230,172	0.873
SDG16	0.723	176.071	0.810
SDG17	0.726	176.079	0.875
EBC	0.809	278,112	0.896

Source: Data from the survey, (2022).

Confirmatory factor analysis (CFA) aims to assess factors that are strongly associated with each other, thus representing a single concept (Hair Jr. et al. 2010). The AFC calculations were performed using the *Varimax rotation* , where the results can be seen in Table 2, which presents the factorial loads, considering that the variables, for the most part, are in accordance with the criteria established in the literature. Item EBC1 had a factorial load of less than 0.5, so it was excluded and calculated again. After exclusion, the results can be seen in Table 2.

Also emphasizing that there is a moderate commonality between the observable variables, thus meeting the criteria of Hair Jr. et al. (2005), in which he suggests that the variables should be above 0.4. All items showed values higher than recommended by the literature. Given the above, Table 2 shows the results obtained with CFA, showing the factor loadings and the commonality of the items.

Table 2 - Constructs and observable variables

Construct (ODS) and Observable Variables	**Factorial Loads**	**commonality**
SDG 1 – Eradication of poverty		
SDG1a- I realize that public policies (Municipal, State and Federal) will reduce poverty by 50% of the population by 2030.	0.661	0.691
SDG1b- I identify that there are national actions, protection programs social security, and which by 2030 will achieve substantial coverage of the poor and vulnerable.	0.669	0.818

SDG1c- I believe that by 2030, there will be equal rights to access to basic services, control over land and other forms of property, natural resources, financial services (microfinance).	0.549	0.720
SDG 2 – Zero hunger and sustainable agriculture		
SDG2a- Based on government actions, I believe that by 2030, it will be possible to end hunger, as well as access to food for all safe, nutritious and sufficient all year round.	0.651	0.735
SDG2b- I believe that by 2030, there may be a doubling of productivity agriculture and the income of small food producers, particularly women, indigenous peoples, family farmers, shepherds and fishermen.	0.766	0.797
SDG2c- I understand that by 2030 there will be sustainable systems of food production and implementation of agricultural practices that increase productivity and preserve ecosystems.	0.557	0.702
SDG 3 – Health and well-being		
ODS3a- I believe that by 2030 we will have a reduction in the mortality rate global mother.	0.680	0.744
SDG3b- I believe that by 2030, there will be a reduction in mortality neonatal and children under 5 years old.	0.680	0.721
SDG3c- I believe that by 2030, we will have universal access to services sexual and reproductive health, including family planning.	0.542	0.750
SDG 4 – Quality education		
SDG4a- I believe that by 2030, primary and secondary education will be equitable and quality education that leads to learning outcomes relevant and effective.	0.658	0.747
ODS4b- I believe that there will be improvements in the physical facilities to education, appropriate for children, sensitive to disability and gender, with safe and non-violent learning environments, inclusive and effective for all.	0.537	0.714
SDG4c- I believe that by 2030, there will be an increase in the number of qualified teachers, including through international cooperation for teacher training.	0.568	0.662
SDG 5 - Gender equality		
SDG5a- End all forms of discrimination against women and girls everywhere.	0.595	0.714
SDG5b - I understand that all forms of violence will be eliminated against women and girls in the public and private spheres, including the trafficking and sexual exploitation.	0.694	0.701
SDG5c - There will be full and effective participation of women, as well as as equal opportunities for leadership at all levels decision-making in political, economic and public life.	0.549	0.723
SDG 6 – Drinking water and sanitation		
SDG6a- By 2030, universal and equitable access to water will be achieved drinkable and safe for all.	0.742	0.758
SDG6b- By 2030, we will have improved water quality, reduced pollution, and increased water reuse.	0.594	0.688
SDG6b- By 2030, we will have improved water quality, reduced pollution, and increased water reuse.	0.689	0.733
SDG 7 - Clean and affordable energy		
SDG7a - By 2030, we will have universal, reliable, modern and affordable energy services.	0.763	0.757
SDG7b- By 2030, we will have an increase and participation of energies renewables in the global energy matrix.	0.796	0.801
SDG7c- By 2030, we will have reinforcement and international cooperation to	0.696	0.741

facilitate access to clean energy research and technologies, including renewable energy, energy efficiency.		
SDG 8 – Decent work and economic growth		
SDG8a- By 2030, we will have policy development and implementation to promote sustainable tourism, which generates jobs and promotes culture and local products.	0.723	0.765
SDG8b - By 2030, we will achieve higher levels of productivity of economies through diversification, technological modernization and innovation.	0.717	0.781
SDG8c - By 2030, we will achieve decent work for all women and men, including for young people and people with disability, as well as equal pay for work of equal value.	0.527	0.736
SDG 9 – Industry, Innovation and Infrastructure		
SDG9a- Inclusive and sustainable industrialization will be promoted by 2030, increasing the participation of industry in the employment sector and in the Gross Domestic Product (GDP).	0.599	0.753
SDG9b - By 2030, there will be support for technological development, the national research and innovation, ensuring a political environment conducive to industrial diversification and adding value to *commodities.*	0.524	0.720
SDG9c- By 2030, scientific research will be strengthened, improving the technological capabilities of industrial sectors by 2030, encouraging innovation and increasing the number of workers in research and development (R&D).	0.674	0.772
SDG 10 - Reduction of inequalities		
SDG10a- By 2030, we will progressively achieve growth income of the poorest 40% of the population at a rate greater than the national average.	0.535	0.759
SDG10b - By 2030, there will be empowerment and promotion of inclusion social, economic and political, regardless of age, gender, disability, race, ethnicity, national origin, religion, economic or other status.	0.576	0.716
SDG10c- By 2030, we will have the implementation of safe policies for migration for people.	0.694	0.671
SDG 11 - Sustainable cities and communities		
SDG11a- By 2030, we will have access to safe housing for all, adequately and at an affordable price, and to the basic urbanization services of the shanty towns.	0.720	0.773
SDG11b - By 2030, we will have access to safe transport systems, accessible, sustainable and affordable for all, improving the road safety through the expansion of public transport.	0.585	0.643
SDG11c- By 2030, we will have a reduction in the negative environmental impact per capital of cities, including air quality and waste management municipalities.	0.587	0.731
SDG 12 - Sustainable consumption and production		
SDG12a- By 2030, Brazil will achieve sustainable management and use efficient use of natural resources.	0.597	0.632
SDG12b- By 2030, in Brazil we will reduce waste generation by through prevention, reduction, recycling and reuse.	0.638	0.670
SDG12c- By 2030, in Brazil we will have relevant information and awareness of sustainable development and lifestyles in harmony with nature.	0.555	0.541
SDG 13 – Action against global climate change		

SDG13a- The World Meetings that deal with climate change issues can bring solutions to the global environmental problem.	0.608	0.709
SDG13b - By 2030, we will have the integration of measures of change in the climate in national policies, strategies and planning.	0.578	0.723
SDG13c - By 2030, we will have improvements in education, increasing the awareness and human and institutional capacity on mitigation, impact reduction and warning of climate change.	0.633	0.661
SDG 14 – Life in the water		
SDG14a- By 2030, we will reduce marine pollution of all types, especially that arising from land activities.	0.656	0.766
SDG14b - By 2030, small-scale artisanal fishers will have access to marine resources and markets.	0.754	0.830
SDG14c- By 2030, we will have more coastal and marine areas preserved, in accordance with national and international legislation.	0.632	0.765
SDG 15 – Life on Earth		
SDG15a- By 2030, in Brazil we will have positive results in the fight against desertification, restoration of land and degraded soil, including lands affected by desertification, droughts and floods.	0.676	0.809
SDG15b - We will reduce the degradation of natural *habitats* , to stop the loss of biodiversity and, by 2030, protect and prevent the extinction of endangered species.	0.642	0.792
SDG15c - By 2030, we will have conservation, recovery and use sustainable development of terrestrial, freshwater, forest, wetlands, mountains and arid lands.	0.542	0.679
SDG 16 – Peace, justice and effective institutions		
SDG16a- I believe in Brazil there are actions by institutions (public and private) for the reduction of all forms of violence and the rates of mortality.	0.572	0.731
SDG16b- By 2030, in Brazil we will have legal identity for everyone, including birth registration.	0.535	0.699
SDG16c- I believe that institutions will be strengthened national institutions for the prevention of violence, the fight against terrorism and the crime.	0.584	0.781
SDG 17 – Partnership and means of implementation		
SDG17a- I understand that by 2030, initiatives and effective measures for sustainable development, which complement the gross domestic product (GDP).	0.629	0.652
SDG17b- I realize that there is mobilization of internal resources, including through international support to countries in development, to improve national capacity to collect of taxes and other revenues.	0.756	0.917
SDG17c- In Brazil, there is a propensity to increase coherence of policies for sustainable development.	0.756	0.917
EBC – Low Carbon Economy		
EBC1- In Brazil, public policies promote a low-carbon economy.	0.823	0.727
EBC2- Public and private institutions develop actions that encourage the low carbon economy.	0.844	0.793
EBC3- In Brazil, there is an effective work of the Institutions to promote the development of the low carbon economy, in the sense of reducing environmental impacts.	0.788	0.836

Source: Data from the survey, (2022).

The calculation of the total variance of the construct was carried out, which presented a value of 74.23%. Subsequently, the total explained variance of each construct was calculated. Table 3 presents the total explained variance of the constructs, which were above 66.49%, with the SDG 14 construct (Life in the Water), which presented the highest value, representing 85.13% of the data variability. This result indicates that the observable variables (SDG14a, SDG14b, SDG14c) contribute significantly to the understanding of the construct.

In this scenario, it can be said that the fight against water pollution, access to resources and markets by small-scale artisanal fishermen and preserved coastal and marine areas, in accordance with national and international legislation, are relevant to the respondents of this research. Consistently, the sustainable use of natural resources, such as water, as well as the preservation of endangered species, both marine and terrestrial, are essential for future generations.

Table 3 - Total variance explained

Constructs	Total Explanatory Variance
SDG1	73.96%
SDG2	70.29%
SDG3	75.32%
SDG4	76.80%
SDG5	78.53%
SDG6	77.64%
SDG7	81.80%
SDG8	73.59%
ODS9	79.81%
SDG10	77.21%
SDG11	76.01%
SDG12	66.49%
SDG13	76.44%
SDG14	85.13%
SDG15	84.18%
SDG16	80.26%
SDG17	74.20%
EBC	82.73%

Source: Data from the survey, (2022).

To use multiple linear regression, Pearson's Correlation matrix was initially analyzed to verify Multicollinearity, which allows finding out whether some independent variables are highly correlated, which prevents Multicollinearity, which occurs when correlations between variables are above 0.8 (Wooldrigge , 2006) . Coherently, Pearson's Correlation showed low correlations between the independent variables, with no Multicollinearity between the observable variables. According to Hair Jr. et al. (2013) multiple linear regression is a statistical, descriptive and inference analysis between a dependent variable (Y) as an effect of multiple independent variables (X) of cause.

For the authors, the analysis indicates the cumulative effects of a group of independent variables (X1, X2, Xn) on a dependent variable (Y), in the same way that it highlights the effects of independent or exploratory variables ($Y = \beta1X1 + \beta2X2 + \beta3X3 +...+ \beta0$). The research verified the relationship between the ODS1, ODS2, ... ODS17 constructs and the EBC, resulting in 17 Models (Table 4). The Models had the averages of the EBC Construct variables (EBC1, EBC2 and EBC3) as a dependent variable (effect) and ODS1...ODS17 (ODS1a, ODS1b and ODS1c... ODS17a, ODS17b and ODS17c) as independent variables (cause).

Table 4 - Multiple linear regression

Model	R	R squared	R squared adjusted	Standard error of estimate
1	0.500 [to]	0.250	0.229	0.82783

The. Predictors: (Constant), ODS1a, ODS1b, ODS1c
B. Dependent variable: MEAN_EBC

Model	R	R squared	R squared adjusted	Standard error of estimate
two	0.566 [to]	0.217	0.195	0.84586

The. Predictors: (Constant), ODS2a, ODS2b, ODS2c
B. Dependent variable: MEAN_EBC

Model	R	R squared	R squared adjusted	Standard error of estimate
3	0.305 [to]	0.093	0.068	0.91039

The. Predictors: (Constant), ODS3a, ODS3b, ODS3c
B. Dependent variable: MEAN_EBC

Model	R	R squared	R squared adjusted	Standard error of estimate
4	0.405 [to]	0.164	0.141	0.87404

The. Predictors: (Constant), ODS4a, ODS4b, ODS4c
B. Dependent variable: MEAN_EBC

Model	R	R squared	R squared adjusted	Standard error of estimate
5	0.496 [to]	0.246	0.225	0.83017

The. Predictors: (Constant), ODS5a, ODS5b, ODS5c
B. Dependent variable: MEAN_EBC

Model	R	R squared	R squared adjusted	Standard error of estimate
6	0.341 [to]	0.117	0.092	0.89862

The. Predictors: (Constant), ODS6a, ODS6b, ODS6c
B. Dependent variable: MEAN_EBC

Model	R	R squared	R squared adjusted	Standard error of estimate
7	0.449 [to]	0.202	0.180	0.85421

The. Predictors: (Constant), ODS7a, ODS7b, ODS7c
B. Dependent variable: MEAN_EBC

Model	R	R squared	R squared adjusted	Standard error of estimate
8	0.578 [to]	0.334	0.315	0.78024

The. Predictors: (Constant), ODS8a, ODS8b, ODS8c
B. Dependent variable: MEAN_EBC

Model	R	R squared	R squared adjusted	Standard error of estimate
9	0.484 [to]	0.234	0.213	0.83657

The. Predictors: (Constant), ODS9a, ODS9b, ODS9c
B. Dependent variable: MEAN_EBC

Model	R	R squared	R squared adjusted	Standard error of estimate
10	0.513 [to]	0.263	0.243	0.82074

The. Predictors: (Constant), ODS10a, ODS210, ODS10c B. Dependent variable: MEAN_EBC				
Model	R	R squared	R squared adjusted	Standard error of estimate
11	0.417 [to]	0.174	0.151	0.86877
The. Predictors: (Constant), ODS11a, ODS11b, ODS11c B. Dependent variable: MEAN_EBC				
Model	R	R squared	R squared adjusted	Standard error of estimate
12	0.456 [to]	0.208	0.186	0.85075
The. Predictors: (Constant), ODS12a, ODS12b, ODS12c B. Dependent variable: MEAN_EBC				
Model	R	R squared	R squared adjusted	Standard error of estimate
13	0.444 [to]	0.197	0.174	0.86055
The. Predictors: (Constant), ODS13a, ODS13b, ODS13c B. Dependent variable: MEAN_EBC				
Model	R	R squared	R squared adjusted	Standard error of estimate
14	0.495 [to]	0.245	0.224	0.83059
The. Predictors: (Constant), ODS14a, ODS14b, ODS14c B. Dependent variable: MEAN_EBC				
Model	R	R squared	R squared adjusted	Standard error of estimate
15	0.554 [to]	0.307	0.288	0.79952
The. Predictors: (Constant), ODS15a, ODS15b, ODS15c B. Dependent variable: MEAN_EBC				
Model	R	R squared	R squared adjusted	Standard error of estimate
16	0.554 [to]	0.307	0.288	0.79586
The. Predictors: (Constant), ODS16a, ODS16b, ODS16c B. Dependent variable: MEAN_EBC				
Model	R	R squared	R squared adjusted	Standard error of estimate
17	0.477 [to]	0.228	0.213	0.83635
The. Predictors: (Constant), ODS17a, ODS17b, ODS17c B. Dependent variable: MEAN_EBC				

Source: Data from the survey, (2022).

The multiple linear regression results show an explanation index greater than 30% (R^2) in all 17 analyzed models. In view of the above, the relationships of the observable variables of the SDGs in the EBC show significant intensities of influence, that is, the SDGs influence the EBC, corroborating the studies by Sprengel and Busch, (2011) and Kondyli , (2010).

In this context, the highest relationship occurred between the observable variables of SDG8 (Decent work and economic growth) and the EBC, showing a high intensity in Model 8 (57%). In this sense, decent work and adequate economic growth are effective actions for sustainable development, as well as international support for developing countries. According to Reilly, (2012) , while international organizations and institutions, such as the United Nations and the European Union, mobilized around the great challenge of sustainability, both on a local

and global scale, the EBC as a key concept began to emerge and consolidate actions for sustainability in our country.

Therefore, Model 2 shows a high influence (56%) of SDG2 (Zero Hunger and Sustainable Agriculture) on the EBC. These results indicate that respondents believe that sustainable agriculture could be a way to generate a low-carbon economy, as well as guarantee quality food for all.

5 FINAL CONSIDERATIONS

The survey results highlight important relationships between the 17 Sustainable Development Goals (SDGs) and the Low Carbon Economy (LBS), in view of the respondents' perception. In view of the above, the relations of the observable variables of the SDGs in the EBC show significant intensities of influence, that is, all the SDGs influence the EBC. In this context, the relevant (highest) relationship occurred between the observable variables of SDG8 (Decent work and economic growth) and the EBC, showing a high intensity in Model 8 (R^2 =57%). These findings corroborate the research by Reilly, (2012) and Severo et al., (2019) , since in recent years, the search for innovative paths that include the SDGs and, now, investments in the EBC, are important for enlightening society, actions aimed at sustainability that bring to the forefront of scenarios on the international agenda.

In this sense, it is up to governments, managers and civil society to act consciously, to put SDG8 into effect, promoting decent work and sustainable development, in improving the quality of the planet, since interconnected they can bring synergies to environmental policies, plans and programs. However, one must invest in educational policies of an environmental, social and economic nature, as this will influence society's awareness, which will impact the quality of life of future generations.

With regard to the research's managerial and social contributions, they allow managers and professionals in related fields to become aware of the importance of the SDGs and the EBC, helping them with strategies for sustainable development. In addition to information for socio-environmental actions of public policies at the regional and national level, to support cities and regions in complying with the 2030 Agenda. Academic contributions are linked to the promotion of studies that aim to contribute to the development of the 2030 Agenda in the Brazilian context, as well as its relationship with the low carbon economy.

Although the survey data do not represent all people in RS, the study cannot be generalized. However, there are limitations related to data collection, from the exclusive perception of individuals. This perception of individuals with the use of a *Likert scale* can allow response biases, such as misleading generalization (Halo effect) described by Bagozzi and Yi (1991). Accordingly, the data were statistically validated using normality tests, simple reliability and variance tests.

As suggestions for future studies, it is encouraged to analyze other regions of the country, being important longitudinal comparative analyzes with the insertion of other environmental and social themes, such as *smart cities* and circular economy. It is suggested that future research also compare regions, with the intention of identifying greater possibilities for aggregating actions that allow a better understanding of the SDGs and the EBC.

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