THE DYNAMIC CAPABILITIES OF CLEANTECHS AND ECO-INNOVATION IN THE USE OF GREEN FISCAL PUBLIC POLICIES

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ABSTRACT

Objective: This paper aims to present how Dynamic Capabilities can generate Eco-innovations to take advantage of Green Fiscal Public Policies in the context of Cleantechs.

Method: The methodological path taken included a multiple case study, in the context of 5 companies. The method approach was qualitative descriptive research with semi-structured interviews applied in the collection period from December (2021) to July (2022), including discourse analysis.

Results: The results demonstrate that Dynamic Capabilities are the preliminary basis for the development of Eco-innovations in Cleantechs. However, for these Eco-innovations to be able to exploit the social benefits of Green Fiscal Public Policies, it is fundamental that these Eco-innovations can generate green spillover effects (Green Spillovers), from economic benefits associated with the generation of jobs, reduction of impacts on the environment and infrastructure development.

Conclusions: The central contribution of the work demonstrates that dynamic capabilities provide innovative solutions balancing the stability of environmental, social, and economic resources in the process of taking advantage of green fiscal public policies, providing positive economic spillover effects to the economy such as increased quality of life, reduction of environmental impact, job creation and stimulus to the development of national infrastructure.

Keywords: Dynamic Capabilities; Eco - Innovation; Green Fiscal Public Policy – Cleantechs

Received: 08/10/2022
Accepted: 12/01/2023
DOI: https://doi.org/10.37497/sdgs.v11i1.248

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AS CAPACIDADES DINÂMICAS DAS CLEANTECHS E A ECOINOVAÇÃO NO APROVEITAMENTO DE POLÍTICAS PÚBLICAS FISCAIS VERDES

RESUMO

Objetivo: O objetivo do artigo é investigar o impacto das Capacidades Dinâmicas na construção de Ecoinovações para o aproveitamento de Políticas Públicas Fiscais Verdes no contexto das Cleantechs.

Método: O caminho metodológico percorrido contou com um estudo de caso múltiplo, no contexto de 5 empresas. A abordagem de método tratou-se de uma pesquisa qualitativa de caráter descritivo, com entrevistas semiestruturadas aplicadas no período de coleta de dezembro (2021) a julho (2022), incluindo análise de discurso.

Resultados: Os resultados evidenciaram que as Capacidades Dinâmicas são base preliminar para o desenvolvimento de Ecoinovações nas Cleantechs. Contudo, para que essas Ecoinovações possam explorar os benefícios sociais das Políticas Públicas Fiscais Verdes, é fundamental que estas Ecoinovações possam gerar efeitos de transbordamento verde (Green Spillovers), a partir de benefícios econômicos associados à geração de empregos, redução de impactos ao meio ambiente e desenvolvimento da infraestrutura.

Conclusões: A contribuição central do trabalho demonstra que as capacidades dinâmicas proporcionam soluções inovadoras equilibrando a estabilidade de recursos ambientais, sociais e econômicos no processo de aproveitamento de políticas públicas fiscais verdes, proporcionando efeitos de transbordamento econômicos positivos para economia como aumento da qualidade de vida, redução do impacto ambiental, geração de empregos e estímulo ao desenvolvimento da infraestrutura nacional.

Palavras-Chave: Capacidades Dinâmicas; Ecoinovação; Políticas Públicas Fiscais Verdes – Cleantechs.

1. INTRODUCTION

The capabilities of organizations are one of the resources that precede innovation in clean technology businesses (de Noronha et al., 2022; de Noronha et al., 2022a; Gramkow & Anger-Kraavi, 2018). This innovation carries characteristics that can achieve ecological sustainability and reduce impacts on the environment and society (Türkeli & Kemp, 2018). For this to happen, companies must plan, identify and adapt to business opportunities, mobilizing resources to address diversified solutions in their business models (Garrido et al., 2020).

Digital-based companies focused on clean technology are known in the market as Cleantechs and structure their business models in a scalable way, guiding their solutions to products and services in eco-innovations that have multiple effects on the economy (Fernando & Wah, 2017; by Noronha et al., 2022a). Eco-Innovations are organizational innovations that focus efforts on reducing environmental impacts, optimizing production processes for ecological and social stability, allocated the resources available in the portfolio of organizations (Bierwisch et al., 2021).

In this context, Cleantechs begin to follow strategic paths to leverage the maximum use of their performance and scale levels that allow them to establish a competitive advantage in

the market through their dynamic capabilities and practical innovations (de Noronha et al. 2022b; Teece, Pisano & Shuen, 1997; Garrido et al., 2020). These innovations are linked to the use of renewable energy and energy efficiency solutions to provide access and sanitation the most diverse technological ways to ensure socioeconomic and environmental benefits (Rangel-Martinez et al., 2021; Shakeel, 2021).

From the dynamic structuring of business models that emanate eco-innovations and unfold from the capabilities of organizations, the use of green fiscal public policies becomes one of the ways to expand the capillarity and reach of the benefits provided through these companies, aiming to create a market environment that exploits not only the market potential, but also provides subsidies to stimulate a business ecosystem prepared to meet the desires of social responsibilities (Fekete et al., 2021; Bierwisch et al., 2021).

The direction of the regulatory structure of green fiscal public policies involves everything from the exemption of taxes and fees to industrial incentives that can unlock bottlenecks to enable digital technological solutions of Cleantechs (Mäkitie et al., 2018). In this way, these policies enable ways to create lean business models to allow sustainable and ecological innovations in conditions of economic and practical viability of the business, unfolding in positive effects for the generation of jobs, improvement of the sector infrastructure and less environmental impact, stimulating conscious and responsible consumption (Fernando & Wah, 2017).

The present work appropriated the conjuncture of Cleantechs and its dynamic capabilities to generate eco-innovations, based on the use of green fiscal public policies, from the precedent that the business models practiced by these organizations generate multiple social, economic and environmental effects and benefits (Sica, 2016; Teece et al., 1997; Gramkow & Anger-Kraavi, 2018). Thus, the work appropriated the theoretical lenses of *Dynamic Capabilities, Eco-Innovation and Green Fiscal Public Policies* of the fields of study of Administration, Economics and Law, going through the levels of analysis of organizations and public administration.

Based on the presented contextualization, the research question of the paper is*: "How can Dynamic Capabilities stimulate Eco-innovation in Cleantechs for the use of Green Fiscal Public Policies?"*. To answer the research question, This paper aims to present how Dynamic Capabilities can generate Eco-innovations to take advantage of Green Fiscal Public Policies in the context of Cleantechs.

The research gap that this paper seeks to explore and understand is how the capabilities of Cleantechs organizations can corroborate for social and environmental development from

economic effects generated through investments in sustainable technologies (Long & Liao, 2021; Sikdar, 2022; Noronha et al., 2022). Furthermore, studies, for example, Lima et al. (2020) identify that it is necessary to investigate how green innovations can be raised by capabilities that aim to collaborate for the formulation and use of policies (Brink, 2019).

The scientific contribution of the work demonstrates that dynamic capabilities provide innovative solutions balancing the stability of environmental, social and economic resources in the process of taking advantage of green fiscal public policies, providing positive economic spillover effects for the economy such as increased quality of life, reduction of environmental impact, job creation and stimulus to the development of national infrastructure. This contribution provides new directions for the fields of administration and public policy, showing that decentralized innovation through clean technology companies can be provided by business capabilities of a strategic and technological nature, unfolding in effects for the economy. On the other hand, the managerial contribution resides in pointing out that companies should consider capabilities to generate eco-innovations that will give room for the use of green fiscal public policies, considering innovative solutions in the energy, sanitation and transport segments.

To carry out this research, the methodological path included a multiple case study, in the practical reality of 5 companies. For in-depth understanding, the selected method approach was a qualitative descriptive research, with semi-structured interviews applied with the collection period from December (2021) to July (2022).

In addition to the introduction, this paper is divided into five sections. The second section deals with the Theoretical Framework, with an overview of the theoretical lenses used. The third section addresses the methodological path. The fourth and fifth sections present the details of the data analysis, the main results and articulated discussions based on the field diagnosis. Section six includes final considerations, details associated with the work's contribution, research limitations and suggestions for further investigations.

THEORETICAL FRAMEWORK

The present work appropriated the theoretical lenses of Economics, Administration and Law to enable the theoretical framework of the research. The theoretical lenses selected are:

- **Dynamic Capabilities:** The organizational capabilities of companies are presented from the perspective of energy studies, articulated to the role of the concepts of sensing, seizing and reconfiguration in the market (Teece, 1997; Garrido et al., 2020). This

theoretical lens is based on studies of Business Administration and Management (Teece, Pisano & Shuen, 1997).

- **Eco-innovation:** The theoretical lens of Eco-innovation is observed as a development of industrial innovation, presenting the types of Eco-innovation as vectors of the result of the organizational operation through Ecological Stability, Resource Stability and Socioeconomic Stability (Tumelero et al., 2019). This theoretical lens is rooted in the foundations of Economics and Administration (Fussler and James, 1996; Bierwisch et al. 2021).
- **Green Fiscal Public Policies:** The theoretical lens of Green Fiscal Public Policies covers the fields of study of Administration and Law (Gramkow & Anger-Kraavi, 2018). The section deepens the facets and incentives of public policies in the public-administrative context (Bucci & Souza, 2022).

2.1. Dynamic capabilities and clean technology studies

The strategic movements to adapt to market changes were contemplated in the field of Strategic Administration, aiming to understand the positioning of organizations in the face of the demands of the market itself, in which capabilities and resources are the center of discussion. The academy focused on understanding how companies act to position themselves in the market effectively, asloporing their internal resources to a strategic reconfiguration to gain competitive advantage. In this sense, *Dynamic Capabilities* are one of the theoretical lenses with capillarity to cover the phenomenon of strategic and technological changes in organizations, defined by the creation, implementation and updating of embedded resources in search of advantages in the market (Teece, Pisano & Shuen, 1997; Luo, 2000).

The seminal studies by Teece et al. (1997) in which they started the debate within the strategic management of organizations, sought to understand the capabilities of companies in the face of this changing scenario. The concept of Dynamic Capabilities in the view of Teece et al. (1997) relies on organizational skills to use information in order to reconfigure acquisitions and integrate innovations into business models. In addition, they do not only seek to adapt, but combine resources for internal and external use to develop new products, business models and processes based on three aspects*: (i) Sensing, (ii) Seizing and (iii) Reconfiguring* (Garrido et al. al., 2020).

(i) *Sensing* is the company's ability to sense and capture opportunities to take advantage of its business and capabilities, in order to effectively position itself in the market context,

exploring the organization's potential. *(ii) Seizing* is about the ability to plan and apply organizational strategies associated with the maintenance of resources to generate innovations and market solutions. *(iii) Reconfiguration* is the ability of companies to adapt and reconfigure in contexts of rapid technological change and which require contingency actions to restructure companies' business models in the face of industrial adversities. Studies of *Dynamic Capabilities* within this referential framework follow the line of the three strands operated by Teece et al. (1997) and that permeate the context of technological change of organizations in the clean technology sector.

In a similar way, the vision of Ottoboni and Sugano (2009) elucidates that the way the organization adapts to the market and manages its strategy in movements of change are operationalized by the dynamic capabilities of companies. This phenomenon is also observed in studies on energy and electricity (Ottoboni & Sugano, 2009; Mosakowski & McKelvey, 1997; Brink, 2019). In the energy sector, it is possible to complement this definition with the vision of Mosakowski and McKelvey (1997) who explains that dynamic capabilities also integrate resources that involve a fully industrial sector and consider not only these resources, but also how they monitor and conduct their management.

Renewable energy sources (e.g. wind, photovoltaic solar, biomass and water resources) play an important role in the global energy industry through their sustainability, energy security characteristics and because it is a non-scarce and non-polluting natural resource compared to fossil sources (e.g. mineral coal, oil and natural gas) (Portman et al., 2009). Considering that dynamic capabilities are essential in their capability to exploit and convert into advantages, these aspects of renewable energy sources make it necessary to understand how companies in this field operate and apply these capabilities in their facilities.

Within the perspective of wind energy, the need to stimulate the use of renewable energies is a process that depends directly on the ability of a company to capture *(sensing)* and apply *(seizing)* each new capabilitie (Oji & Weber, 2017; de Noronha et al., 2022). The authors explain that, in a larger context (such as a national economy, for example), dynamic capabilities when applied to renewable energy projects should aim at encouraging country policies within this sector and the changes promoted by them. In this context, energy companies that operate in the national sector need to *reconfigure* their strategic processes according to what happens to the national economy (Brink, 2019).

Oji and Weber (2017) cite Brazil as an example of this reconfiguration process. In 2004, the country began to use an auction model applied to the energy market, which changed the

way wind capability is architected within the national territory. Companies in the sector began to reconfigure the organization of their wind farms, this time taking into account all the variables of the Brazilian economy that could impact the energy market. Since these changes and possible threats have been detected at the national level *(sensing)* it is inevitable that we will think of ways to reposition resources *(seizing and reconfiguring)* so that these organizations can continue to align with the new pace of installed capability within Brazil. In this case, some of these changes include the new policies to encourage the country and the number of wind farms to be built that will inevitably influence the installed wind capability of Brazil as a whole.

1.2. Eco-innovation and its theoretical articulation

One of the first definitions of eco-innovation was expressed by Fussler and James (1996), such as: product and process innovations with a sustainable focus, i.e., reduction of negative environmental impacts and more efficient use of resources and energies. More recent definitions such as Kemp et al. (2019) relate eco-innovation to the new perspectives of the 21st century, addressing new technologies and the growing demand for sustainable resources. However, it maintains eco-innovation conceptually similar to the past, which is understood as the creation, improvement of a process, product or system aimed at sustainability and the unfolding of industrial innovations.

Eco-innovation is seen from two other opposing facets: *neoclassical* versus *evolutionary* (Sica, 2016). In the *neoclassical* approach, eco-innovation is understood as a fundamental aspect of environmental sustainability, along with social and economic changes, institutions and political instruments that intensify the development of these eco-innovations (Hazarika & Zhang, 2019; Lima et al., 2020; Long & Liao, 2021; Sikdar (2022). From an *evolutionary perspective*, it is understood that organizational, social and institutional innovations naturally meet sustainable global demands. Despite the difference between the two approaches to eco-innovation, these approaches are distinguished by the economic, social and institutional elements that interact with each other (Bierwisch *et al., 2021*).

In addition, scientific literature shows that there are several types of eco-innovation that are associated with the structuring of green public policies and can start from initiatives and capabilities of organizations (Gramkow & Anger-Kraavi, 2018). Among these types are: *Eco-innovation in product, Eco-innovation process, Organizational Eco-innovation, Eco-innovation of Marketing, Social Eco-innovation and Ecoi-nnovation System*. Table 1 shows the different types of eco-innovation and their definition, as well as indicators in the political and

social sphere, originated and compiled based on the study by Tumelero, Sbragia and Evans (2019):

Table 1: Definitions of Types of Eco-Innovation and their qualitative indicators.

Eco-innovation Type	Definition	Qualitative Indicators
Process eco-innovation	This is the improvement or creation of a new process focused on reducing the consumption of materials and energy	Contamination; Legislation; Reduction; reuse; Energy.
Product eco-innovation	Creation, adaptation or creation of a product based on sustainable solutions that can reduce the environmental and social impact	Packaging; Construction; Recycling; Decomposition; Waste Materials; Efficiency; Bioinspiration.
Organizational eco-innovation	Creation and structuring of business models in the management process, aiming at the articulation of teams that guide the company's values for its performance in the market	Management; Tendencies; Teams; Information; Projects; Experiences.
Marketing eco-innovation	Environmental and social innovation in the organization's communication and dissemination process to expand market reach.	Ecodesign Green Labels; Exhibition; Promotion; Price.
Social eco-innovation	Creation and implementation of a process, product or service that provides effects and impacts for different spheres of society, aligned with the organization's social responsibility values	Forms of Consumption Generation of internal and external jobs; Human rights; Society; Product liability.
System eco-innovation	Implementation of a new method or process in a service or product production system. Eco-innovation in the system appropriates technologies and solutions to increase the efficiency of the organization	Environmental, social and economic factors; New systems.

Source: Adapted from Tumelero et al. (2019)

2.2.1. The pillars of Eco-innovation

According *to* the seminal studies of Fussler and James (1996) and Bierwisch *et al*. (2021), eco-innovation can be understood in the literature from three fundamental pillars that will be stressed throughout this section: *Ecological Stability*, *Resource Stability*; *Socioeconomic Stability*. These pillars are also the categories of analysis for structuring the research logic of the present work, and are deepened in the paragraphs below.

Ecological Stability is aimed at maintaining and protecting the environment and is understood as the conscious use of resources, in a dynamic harmony between the equitable availability of goods and services for all people and the preservation of the earth for future generations (Morton, Pencheon & Squires, 2017).

Resource Stability presents the conscious use of natural resources and their availability (Fussler & James, 1996). In observing this category, we enter into environmental and energy issues, so that energy production flows and the disposition of natural resources are the basis of

exploration relationships in the current scenario of global sustainability. Due to the continuous and large-scale use of non-renewable energy sources (e.g. mineral coal, oil and natural gas), an environmental problem is created over a number of challenges and concerns to high carbon emissions (Owusu & Asumadu-Sarkodie, 2016). In this way, eco-innovations have become an integral part of the path to resource stability, as they promote the concepts of the circular economy and the creation of new renewable technologies (Karjalainen & Heinonen, 2018; Dalton & Gallachóir, 2010 De Noronha, 2022c; Long & Liao, 2021; Sikdar, 2022).

In addressing eco-innovation, *Socioeconomic Stability* evidences the interconnection of the social and economic sphere, while promoting innovations in order to foster the market and enable solutions aimed at preserving life and the environment (Bierwisch et al., 2021). The governmental, social and business spheres are intrinsic parts of the development of eco-innovations, since they are able to collaborate through university research, government incentive policies and investment decisions (Kobarg et al., 2020; Owusu & Asumadu-Sarkodie, 2016).

Since eco-innovations generate a circularization of the economy through structural changes in the organizations' market and in the logic of the consumer through the sustainable ideal, public policies begin to adopt and promote the aspects of Stability presented, aiming at their social, technological and preservationist benefits (Dalton & Gallachóir, 2010; Bierwisch et al., 2021). Thus, this study observes the pillars of eco-innovation as categories of qualitative analysis.

2.3. Green Fiscal Public Policies

The perception regarding public policies in the view of constitutional law is established in the existing fundamental principle of social rights. These fundamental human rights in society are quantified through the positive actions provided by states. Additionally, these actions can be coordinated to the private sector, in order to build an administrative device that is positive for coping with problems of public law (Bucci & Souza, 2022).

The formulation of public policies is an instrument of government action for the benefit of society that can analyze and propose changes to the activities performed. This role aims to ensure the implementation of proposals in the face of basic fundamental rights. Public policy approaches can be sectorized and are arranged as infrastructure, energy, transportation, and other policies. The sectoral characteristic considers public policies as an instrument for the development of the constant improvement of quality of life (Bucci & Souza, 2022).

Additionally, defined by the International Monetary Fund (IMF), fiscal public policy is understood as *"the use of government expenditure and taxes to influence the economy"* (Horton & El-Ganainy, 2012). Thus, governments can use public finances from taxes (generators of public revenues) and public expenditure, to encourage the economy and foster the adoption of green technologies (eco-innovation), boosting climate change mitigation, waste management and promoting the sustainable use of natural resources (Gramkow & Anger-Kraavi, 2018). This government articulation defines what green fiscal public policies are.

When addressing the level of the scope of green fiscal public policies, it is necessary to understand the various sectoral segregations that can be encouraged for eco-innovation, such as: electricity production, energy efficiency, oil and gas production, efficiency standards for appliances, passenger vehicles, freight transport, energy consumption (industry, buildings and transport) (Fekete et al., 2021). Also in this aspect, there are different levels of policy makers: locations that are defined specifically for a city and/or state, federal and multilateral, such as the United Nations (UN), capable of defining international guidelines through agreements and assemblies (Herman & Xiang, 2020).

In this way, public policies can encourage the market to redistribute large-scale sector resources already consolidated to eco-innovative industries, from a combination of different policy measures (Mäkitie et al., 2018; Long & Liao, 2021). Its ability to foster new industries aligned with green need covers: financing, tax incentives (e.g. ICMS, IPI, IR, Import tax and export tax) and subsidies (non-reimbursable funds) (Gramkow & Anger-Kraavi, 2018). As Gramkow and Anger-Kraavi (2018) indicate, the combination of fiscal policies can stimulate national contexts for infrastructure development, aiming at the sustainability of emerging economies.

In this scenario, public policies that support eco-innovation industries need to be worked together with policies that affect the profitability of the activities of the same sector (Mäkitie et al., 2018). The positive influence of green fiscal public policies on the development of eco-innovations is illustrated in the literature, based on organizational innovations (Fekete et al., 2021; Lima et al., 2020). In this study, green fiscal public policies are observed about the induction of organizations through their capabilities to generate eco-innovation. In this sense, green fiscal public policies are observed as a single singular category of analysis, aiming at conceptual articulation with the other categories that articulate the concept.

3. METHODOLOGY

This section presents the methodological path of research that has a qualitative approach.

The techniques used were deepened during this section. In addition, the research was guided by a multiple case study with entrepreneurs and employees working in Cleantech startups. Additionally, discourse analysis was applied with support to atlas TI software, usually used in qualitative data analysis. The duration of the research was established in the framework of December 2021 to July 2022.

3.1. Research and Method Approach: Qualitative Multiple Case Study

The study used a qualitative descriptive approach to understand, observe and analyze the phenomenon under study. This approach enables researchers to have an approximation of the research object through different theoretical lenses, understanding the layers existing during the study event. In the logic of (Yin, 2016), the method allows researchers to go through all layers of the study event and perform proper data collection.

The study aimed to make inferences from multiple cases. The multiple cases allowed us to visualize the similarity of the phenomenon studied through different scenarios, reducing the possibility of analysis from a single perspective (Yin, 2016). In this sense, for the present study, it was considered that multiple lines of evidence could discard particularities, converging and expanding the reliability and robustness of the present method, to support conclusions based on the selected references (Zainal, 2007). In addition, multiple case studies aim to answer research questions that have the "How" in their approach (Gustafsson, 2017). In this perspective, the adoption of this type of study was contemplated to meet the research proposal.

3.2. Methodological path for case study

Through the research approach, the methodological path was established and divided into 4 stages (Gustafsson, 2017). The steps are (1) Elaboration of the Research Pillars; (2) Definition of Methodological Paths; (3) Field application; (4) Analysis and Reports.

Below is a description of the steps of the methodological path:

1. **Elaboration of the Research Pillars:** Definition of research question and objectives, aiming at the selected unit of analysis. Alignment with the research gap and the justification presented fronts the existing theoretical lenses for analysis of the phenomenon.

2. **Definition of Methodological Paths:** Selection of the search approach. Definition of the chosen cases and criteria addressed to enable the work. Selection

of the collection instrument from the refinement of the literature. Mapping organizations to apply the research script. Definition of the collection method and analysis techniques.

3. **Field aplication:** Data collection in the field, based on the methodological paths established. Application of the research instrument and pre-measurement of the collected data, aiming at validation based on the literature.

4. **Anlyses and report:** Analysis and interpretation of the data collected with the support of research software and analytical categories of the research. Structuring of research reports aiming at the data analysis sections, results and discussions and final considerations. The reports created allow the detailed analysis of the data obtained in the field application

3.3. Collection instrument

Data collection for the case study method was performed based on semi-structured interview techniques and secondary data (Hernández-Sampieri et al., 2006). The semi-structured interviews had open questions and allowed the interviewees to answer about the development of ecoinnovations, based on the dynamic capabilities in cleantech organizations, which aimed at structuring green public and fiscal policies.

The selected collection instrument is the research script with the questions of semi-structured interviews. Thus, the script is divided into reference blocks and respective categories of theoretical lenses, for example, in Table 2 below. In addition, a powerpoint presentation was used to illustrate key concepts during the research. In addition, the implementation of the roadmap took place during January/2021 to September/2022.

The roadmap was validated by sector executives operating within the onshore and offshore wind and decentralized technology solutions.

Tabela 2: Research Roadmap

Referential Block	Categorias	Research Roadmap Question	References
Introductory Question	-	Could you inform your position and the sectoral and strategic scope of your Cleantech, organization size and other information illustrating key eco-innovations?	Introductory Question
Dynamic Capabilities	*Sensing*	How does your Cleantech identify and perceive new industry opportunities for creating eco-innovations that collaborate with the structuring of green or fiscal policies? Cite examples.	(Teece et al., 1997; Garrido et al., 2020; Rangel-Martinez et al., 2021; Brink, 2019; De Noronha, 2022).
	Seizing	How does your Cleantech work on its capabilities and strategic planning to create innovations and processes aimed at creating eco-innovations? Cite examples.	(Teece et al., 1997; Garrido et al., 2020; Rangel-Martinez et al., 2021; Brink, 2019; De Noronha, 2022).
	Reconfiguring	How does your Cleantech work on its capabilities and strategic planning to create innovations and processes aimed at creating eco-innovations? Cite examples.	(Teece et al., 1997; Garrido et al., 2020; Rangel-Martinez et al., 2021; Brink, 2019; De Noronha, 2022).
Eco	Ecological Stability	How do you believe that your Cleantech's capabilities can promote ecological stability and support the use of green fiscal public policies? Cite examples.	(Gramkow, & Anger-Kraavi., 2018; Hazarika & Zhang, 2019; Fussler e James, 1996; Owusu e Asumadu-Sarkodie, 2016).
	Resources Stability	How do you believe that your or other Cleantechs can adapt and reconfigure itself to a context of new public policies, aiming at eco-innovation and market solutions? Cite examples	(Gramkow, & Anger-Kraavi., 2018; Hazarika & Zhang, 2019; Fussler e James, 1996; Owusu e Asumadu-Sarkodie, 2016).
	Socioeconomic Stability	How do you believe that your Cleantech's capabilities can promote socioeconomic stability and collaborate with the use of green fiscal public policies? Cite examples	(Gramkow, & Anger-Kraavi., 2018; Hazarika & Zhang, 2019; Fussler e James, 1996; Owusu e Asumadu-Sarkodie, 2016).
Green Fiscal Public Policies	Green Fiscal Public Policies	How do you see the influence of Green Public Policies to foster national economic development and provide the insertion of clean technologies, in addition to ensuring access to clean and affordable energy in society?	(Horton e El-Ganainy, 2012; Herman & Xiang, 2020; Mäkitie et al., 2018; Gramkow e Anger-Kraavi, 2018).
Aditional Question	-	Could you comment on some case of eco-innovation and the structuring of green public and fiscal policies that have resulted in solutions from cleantech's capabilities? If you want to complement with examples and references feel free.	Closing question

Source: Prepared by the authors

3.4. Research Context: Cleantech Companies

The study object used to analyze the research problem is tied to *Cleantech* startups. Coming from the addition of environmental concerns to agile and lean models, cleantech startups emerge, also called *GreenTechs* (Fernando & Wah, 2017). These startups are organizations that have processes and initiatives in the environmental field with a technological approach, aiming to reduce the negative environmental impact of their operations, as well as create products and services for the preservation of the planet (Fernando & Wah, 2017).

Cleantechs are early stage companies, capable of generating value from the sustainable business model. These companies develop products, services or processes, optimizing environments and social from the resources used, aiming at the use of renewable materials and producing less pollution than current standards (Shakeel, 2021).

Due to its sustainable characteristic, this type of organization has strong environmental orientation and develop eco-innovations aimed at reducing pollution and extraction of natural resources, as well as renewable energy generation, recycling, green transport, green buildings, green chemistry, among others (Rangel-Martinez et al., 2021; Shakeel, 2021).

These characteristics strategically position this type of organizations in a dynamic, technological and sustainable business environment (Giudici et al., 2019). The constant changes in the ecosystem and the environmental challenges in greater evidence due to the call for sustainable development have framed Cleantechs as organizations that need to be deepened from the administrative public point of view, in order to understand innovations (Pernick & Wilder, 2007; Shakeel, 2021).

3.5. Sample selection criteria and their characteristics

For the choice of companies, the particularity of the company was evaluated as an object of study, aiming to observe the theoretical lenses and research script, as highlighted by Yin, (2016). The following criteria were defined within the unit of analysis:

I. Present different types of eco-innovation, based on qualitative indicators presented in Table 1.

II. Cleantech should have technological solutions, aiming to address issues of environment and society, aligned with the sustainable development of economy and politics.

III. Cleantech managers should have knowledge about green fiscal public policies and organizational innovation.

Thus, 5 interviews were conducted with 5 companies in which each interview lasted between 30:08 and 53:10 (see Table 3). All interviews were recorded and transcribed. To organize the transcriptions, a database was developed, which allowed from the transcriptions, the realization of a conjunctural and discursive analysis of the interviews.

Yin's precept (2016) was followed, emphasizing the importance of researchersand researchers paying adequate attention to respondents to obtain information without compromising the interviewees' answers and identity. It is emphasized that the identity of the companies and interviewees was preserved, aiming that organizations and managers could feel free to provide information addressed by the semi-structured research script.

Table 3: Sample Characteristic

Interviewee	Company	Position	Sector	Eco-innovation	Date	Duration
Interviewee 1	Company A	Founder	Renewable energy	Creation of a hydrogenerator that allows the generation of energy through a hydrokinetic turbine. Thus, taking advantage of the kinetic energy of the movement of sea currents.	January/21	30':08"
Interviewee 2	Company B	Founding Partner	Renewable energy	With certain processes allow the transformation of sloth (organic waste) into bioenergy sources, such as: biocoal, bioiland and biogas. Taking advantage of this, a material that usually has as an end the sewage is transformed into biomass.	April/21	27':47"
Interviewee 3	Company C	Founder	Energy	Creation of rechargeable lithium batteries. Through its 100% cobalt-free composition and product life cycle designed for recycling, it promotes a certain degree of sustainability.	September/21	28':36"
Interviewee 4	Company D	Founding Partner	Renewable energy	From an accessible program of financing and monitoring of energy efficiency, it leads to the possibility of changing the usual energy matrix through solar energy.	May/22	45':10"
Interviewee 5	Company E	Founding Partner	Sanitation and water	Through their own devices, they are able to analyze and collect data from hydrometers and gas meters, in order to avoid waste and assist in the construction of intelligent cities.	September/22	53':19"

Source: Prepared by the authors

3.6. Sample analysis levels

In order to align the research context and the selection of theoretical lenses used to observe the phenomenon, they were categorized into two levels of analysis to frame the results obtained. Detailed in the items below:

- **(1)** ***Organizational Level*****:** The organizational level comprises the company's internal practices, which translate the lens of dynamic capabilities and eco-innovation, observing how Cleantechs solutions their solutions in relation to the categories of analysis. This level of analysis is associated with the company's internal innovations and eco-innovations, consolidating the reference axis for data collection.
- **(2)** ***Public Level:*** The public level is associated with the public sphere that can be contemplated about the perspective of organizations and their adaptation and participation in the structuring of existing policies and discussed in the current context of research. This level considers the engagement between the organization and the public sector in the process of structuring eco-innovations.

3.7. Data Analysis Technique: Research and Software Categories Used

The Atlas TI software was used to encode and interpret the data collected from the case study. Through different textual and visual sources, it allows compiling the interviews in individualized documents, which were semantically categorized, aligned with the research lens or the theory adopted corroborate the structuring of the results (Klüber, 2014).

The analysis technique used in this research is Discourse Analysis. The Discourse Analysis technique is a textual language analysis aimed at understanding the word and discursive expression for the semantic understanding of the research object (Coulthard & Condlin, 2014). This technique was selected, aiming at bringing participants closer to data collection through interviews. Subsequently, these data were cross-referenced with bibliographic references, seeking to work directly on the communication from the evidence in the field.

In addition, the discourse analysis method allowed evaluating and comparing assumptions about the values, feelings, intentions and opinions of the agents that generate the collected data. These dimensions are important to understand the discursive questions related to context and theoretical lenses (Gill, 2000).

For the analysis, the interviews were transcribed, separated into different files for each

interviewee and their information organized into categories, in order to assist in the structuring and understanding of the collected data.

The method of analysis included the triangulation of data between interviews, secondary documents and field notes performed during the application of the script (Wilson, 2014). The triangulation method was used in this study to contribute to the validation of the results and structure the analysis process. The collected data were extracted from different sources, namely: interviews, observations, field notes and documents from the websites of the organizations selected for the study (Wilson, 2014; Gill, 2000).

4. DATA ANALYSIS: DISCOURSE ANALYSIS

To perform the data analysis of this article, discourse analysis was used, aiming to discuss the proposed text, from the theoretical lenses selected for the research. Thus, the interviewees' reports related to the categories found in the theoretical framework were selected, later numbered in order to obtain the statistical incidence of repetition, making it possible to understand the relevance of each theoretical category instrumentalized during the study, which in turn generates the deepening of the concept via the collection instrument.

From the conceptualization of Elo and Kyngäs (2008), Discourse Analysis has two characteristics: deductive and inductive. The deductive category is conducted through the theoretical framework and is operationalized for the construction of the semi-structured research script. The other spectrum is the inductive category, where they are ascending findings, which arise without premeditation from the referential direction. For this research the inductive categories are also called "Emerging Categories".

In order to organize the analysis structure, this article divides the work into four blocks of analysis: (a) Dynamic Capabilities Block, (b) Eco-innovation Block and (c) Emerging Categories Block. The block separation is performed in order to evaluate each category representing the subconcepts of the research explored in the theoretical framework (Elo & Kyngas, 2008).

Block A - Dynamic Capabilities presents the main reports related to the categories of *sensing, seizing and reconfiguring* (Teece et al., 1997; Garrido et al., 2020; Rangel-Martinez et al., 2021; Brink, 2019; From Noronha, 2022). Block B - Eco-innovation, relates its pillars of: Ecological Stability; Resource Stability and Socioeconomic Stability, with the collected reports (Gramkow & Anger-Kraavi, 2018; Hazarika & Zhang, 2019; Fussler & James, 1996; Owusu & Asumadu-Sarkodie, 2016). Block C - Green Fiscal Policies reveals the relationship between the other blocs as enablers of green policies (Horton & El-Ganainy, 2012; Herman & Xiang, 2020; Mäkitie et al., 2018; Gramkow & Anger-Kraavi, 2018). Finally, Block D - Emerging Categories, brings new perspectives that were not previously on the research radar.

Table 4: Reports, categories and incidences

Block	Analysis Categories	Repetition (n)	Representative Transcription
Dynamic Capabilities	*Sensing*	n= 23	*Existing devices give mobility to understand the consumption behavior of each customer [...] We have an intelligence that through satellites we can identify the different climate changes and monitor prices and send notifications to consumers in periods spent [...] Algorithms can also map specific data to differentiate customers, and with these insights we can improve our service plan and provide specific options for different consumers, giving a autonomy to choose products through the Internet of Things in smart meterings. (Interviewee 4)*
	Seizing	n= 18	*"[...] we have a technological and digital monitoring network to reduce waste and losses in water consumption and leaks [...] artificial intelligence sensors detect the necessary repairs and with maintenance support it is possible to solve and remedy leak problems in real time. This on a large scale can provide immeasurable gains for residents of large cities like São Paulo. To get an idea, today Brazil loses 38% of the water it collects in the springs during its distribution. To understand the proportion of this volume, if we saved approximately 20% of what we lose, we would already have enough water to supply the 35 million Brazilians who do not have access to drinking water. The Brazilian loses a lot of water and financially this represents a cost of 10 billion reais every year. (Interviewee 5)*
	Reconfiguring	n= 14	*"The changes in the current rules of commercialization and compensation of energy applied by ANEEL - National Electric Energy Agency allowed the commercialization of quotas of solar energy. Entrepreneurs who own bakeries, restaurants and shopping malls can buy energy without installing solar panels [...] It was a rapid adaptation to trade and the opportunities that opened up for the energy sector because we know that the National Interconnected Energy System is complex and has a number of structural issues that depend on transmission and distribution of energy to the major centers" (Interviewee 4)*
Eco-innovation	Ecological Stability	n= 19	*"The renewal of the matrix is very important for urban mobility and will be fundamental for a sustainable future, considering that most of the world's car fleet is based on gasoline and fossil fuels [...] The launch of new cars, electrical filling stations and even readaptation of the production chain, pushed innovations to the green economy, innovation in customary processes led by sensors and intelligent systems revolutionized in areas such as: recycling cycles, assembly of products, replacement of materials and use of scarce raw materials" (Interviewee 2)*
	Resource Stability	n= 22	*"The green resumption depends on the positioning of companies and their responsibility in the production of renewable and clean energy [...] Companies and government need to look at their resources and the type of energy, upgrade their portfolio to enable other infrastructure sectors such as transportation to revitalize their fleets with electric, hydrogen-powered cars that can have the structure to enable the different types of innovation." (Interviewee 1)*

	Socioeconomic Stability	n= 24	*"Carbon offset is a solution that can collaborate with the issue of climate change by capturing carbon. For this, the issuance of certifications and use of renewable energies that can promote sustainable consumption is considered." (Interviewee 1)* *"IoT and the cloud help a lot to monitor and create new products for the market in general, but we believe blockchain is the next step for carbon trading between companies, especially in relation to the certification market [...] Not only startups but large companies need to keep up with the technological trend of energy trading and blockchain certificates, as well as the monitoring solutions that already exist to reduce the carbon footprint" (Interviewee 2)*
Green Fiscal Policies	Green Fiscal Policies	n= 21	*"[...] The issue of fiscal policy for projects within the sustainable scope is very interesting to leverage the chances of viability of these projects. I believe that in this way public policies are also part of a legal and regulatory structure that facilitates the penetration of innovations in the infrastructure sector. [...] For example, in the energy sector you have specific usage tariffs and encouraged to depend on the energy source. This for us is an excellent opportunity to enter the market and boost the models we have of innovation, making the project move faster in the pipeline [...] I believe that it is not only the development of projects that is on the agenda, but the issue of state initiative in providing subsidies to society from Social Tariffs, making a maintenance from the regulatory equipment in order to fill gaps in the constitution of social rights. This is important to us, as every organization today needs to see the impact beyond the viability of the project. [...] (Interviewee 1)*
Emerging Category	*Green Spillover*	*n= 16*	*"Access to financing for renewable energy development can have several positive impacts on society and this still supports the innovation of an industry. Some jobs are generated per MW installed and it is expected that at the end of 2023, counting distributed generation and utility scale we will have more than 20 GW of installed capability, then there will be several jobs generated and new opportunities, not to mention access to the possibilities of buying energy in the free market [...] Access to discounts and tax policies allows the development of an industry that is not nationalized, creating the basis for local content, but for this not only Cleantechs but large companies have to have a well-addressed innovation strategy in their business models" (Interviewee 4)*

Source: Prepared by the authors

4.1. Dynamic Capabilities Block

Through transcription analyses, the Dynamic Capabilities Block proved intrinsic to the development of eco-innovations, via the categories *sensing*, *seizing* and *reconfiguring* (Teece et al., 1997; Garrido et al., 2020). The interviewees demonstrated that from the dynamic capabilities it is possible to analyze and restructure the business in order to overcome and overcome technological and business model barriers.

The data collected demonstrated that there is a robust connection between the sensing category and eco-innovations, which are using technologies such as IOT, Big Data and Data Cloud to enable this development (Interviewee 4). Visualizing solutions for monitoring energy and water consumption behavior, solutions to prevent carbon emissions, solutions for gas capture and even adoption of renewable energies, corroborating the global context of climate change and global social inclusion. The reports related to the Sensing category for the context of Cleantechs are concomitant with the existing literature presented by Oji and Weber (2017).

The Seizing category manifested itself as a transitory mechanism for the allocation of technological resources, aiming to obtain sustainable gains for clean technology companies (Rangel-Martinez et al., 2021; Brink, 2019; From Noronha, 2022). Interviewee 5 shows a consensus of the data collected, indicating that natural resources are finite and organizations need to focus their technologies on digital solutions to complement existing technologies, reducing cost bottlenecks, technology and research and development. According to the reports, the seizing category manifests itself in Cleantechs for strategic restructuring of existing solutions, making processes cleaner and more technological. However, because Cleantechs' resources are limited and depend on high investments from investment funds and financial institutions, seizing is driven by the initiative of entrepreneurs seeking incubation, acceleration and financing to restructure resources and deepen technological knowledge to serve innovative and sustainable solutions to the market (Klewitz, & Hansen, 2014).

Reconfiguring presented itself as a contrast trace for the structuring of sustainable business models from a socio-environmental and competitive point of view in the organizational sphere (Brink, 2019; Garrido et al., 2020). The reports showed that the business model of Cleantech companies (Interviewee 4), should have flexibility in the aspects of rapid business restructuring, visualizing the regulatory environment of the infrastructure sectors. Topics such as decentralization of energy systems and autonomy for energy commercialization, are fundamental to achieve the sustainability of individual solutions, at a competitive price, offered by businesses that adapt to environments with complex regulatory framework. On the other hand, Cleantechs can also be considered reconfiguration gears for innovation of large power systems, modifying contexts of transmission, generation and distribution of energy in countries. The entrepreneurial initiative via causation, aimed at the end user in the context of

providing solutions, reverberates in multiplier effects for large infrastructure sectors, subsidizing with technological solutions that in addition to cheapening costs, make renewable systems clean and with less impact on the environment.

a. **Eco-innovation Block**

The eco-innovation block was the block of analysis with the highest categorical incidence of repetition, as shown in table 4. The interviewees found that eco-innovations unfold from dynamic capabilities articulated to the stability of resources, ecological and socioeconomic. These eco-innovations appear in the form of technological and digital solutions to optimize energy efficiency-related solutions, water waste monitoring, use of renewable energies such as solar and wind and even provide access to energy (Fussler & James, 1996; Owusu & Asumadu-Sarkodie, 2016; Fernando & Wah, 2017). Capabilities have been presented as resources preceding eco-innovations.

Ecological Stability presented itself as a category with a lower incidence of repetition in the block, however, the interviewees mentioned that the maintenance capabilities of digital technologies, give scope for the adoption of technologies that provide pathways to the green economy, spreading the possibility for innovations linked to electric cars and renewable energies (Interviewee 2) (Hazarika & Zhang, 2019). The interviewees reinforced that ecological stability is an important premise so that the innovation worked by the organization can adopt clean energy and sanitation solutions and take advantage of public fiscal policies that exempt the payment of distribution tariffs, reducing the financial impact of tax burdens (Fussler & James, 1996; Owusu & Asumadu-Sarkodie, 2016).

The Category of Resource Stability was the second category of the block with the highest incidence and its numerical sample and was mainly due to the interviewees' reports regarding the allocation of internal and external resources to the organization that are the basis for structuring the business (Karjalainen & Heinonen, 2018; Dalton & Gallachóir, 2010). The category was present in previous reports to generate innovations with the possibilities that the organization has in balancing environmental resources and resources of the organization to create an innovation capable of generating competitive market advantages (Interviewee 1).

The category with the highest repetition of categorical incidence is Socioeconomic Stability. Socioeconomic Stability comes from leveraging opportunities through technologies such as IOT, cloud and Blockchain, reducing costs in trade and allowing the scalability of the organization. According to the interviewees, in addition to the category permeated by the technological scope, eco-innovations must have a social and economic approach (Bierwisch et al., 2021). Among these innovations are mitigation in the emission of pollutants and gases harmful to the atmosphere, optimization of water use in cities and financing and credit for the implementation of renewable energies (Interviewee 1 and 2).

4.3. Green Fiscal Public Policy Block

The Green Fiscal Public Policies block presented itself as a result of the use of the categories of dynamic capabilities and eco-innovation blocks (Bucci & Souza, 2022). During this block, respondents cited points of social tariffs, tax burden, exemption from tariffs and the monitoring of innovations that can be accommodated in the existing regulatory frameworks.

In this block were mentioned about the exemption of TUST (Transmission System Use Tariff) and TUSD (Tariff of The Use of Distribution Systems) and the possibility of energy compensation for the commercialization of renewable energy (Gramkow & Anger-Kraavi, 2018). The representatives of cleantechs interviewed reinforce that for the effective use of these existing policies happen the company needs to be attuned to the regulatory devices and existing laws (Interviewee 1), making the business models can cover necessary social and economic gaps that can be contemplated by green fiscal public policies (Mäkitie et al., 2018; Gramkow & Anger-Kraavi, 2018).

The interviewees reinforced that social and environmental agendas are main focuses for structuring a business model that can explore green fiscal public policies (Horton & El-Ganainy, 2012; Herman & Xiang, 2020). Some interviewees pointed out that by nature cleantechs' scope of market action tends to collaborate with issues of social and environmental agenda, however, the company must observe the regulatory environment before creating its model, allowing ecoinnovations to balance their resources for the effectiveness in the use of these policies (Interviewee 4);

4.4. Emerging Category Block: Green Spillover

The main finding and category of the emerging category was *Green Spillover*. According to the literature the *"Green Spillovers"* are overflowing effects on the economy that can have positive or negative impacts by energy-saving investment (Noailly & Shestalova, 2017). This overflow can be provided by the knowledge and innovation practiced by organizations that articulate the investments received to disseminate innovative solutions in the market and consequently unfold effects on the economy, society and the environment (Dechezleprêtre, Martin & Mohnen, 2014).

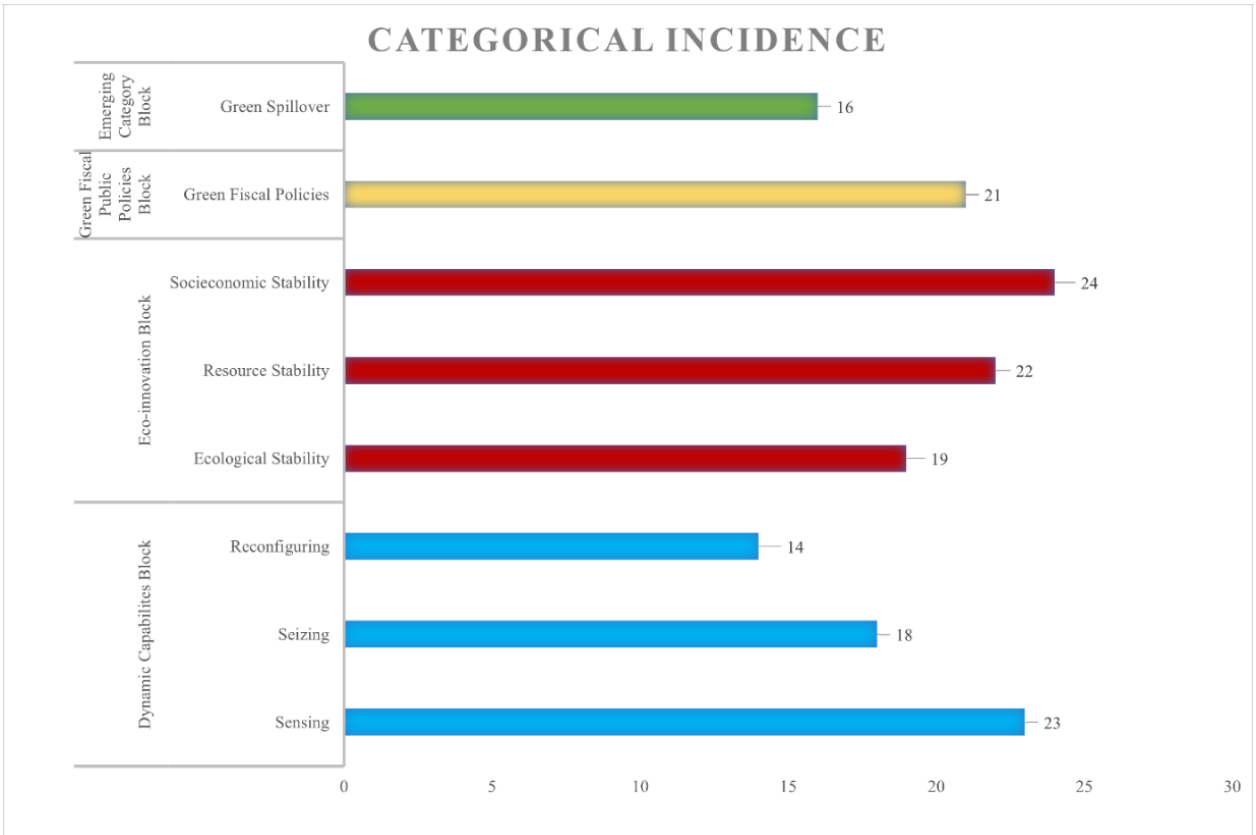
Interviewee 4 showed that Cleantech's innovation solutions can provide economic effects for job creation and reduction of negative environmental impact, providing technological solutions via renewable energies that open up a number of market opportunities associated with the creation of local content policies. In addition, it was highlighted in the speech of the other interviewees that the use of green fiscal public policies caused through Cleantechs, allows these effects to occur in a transversal way in the economy because they give room for the creation of smart cities, accelerate the electrification of fleets and allows consumption to become conscious and responsible through energy efficiency

solutions. This use goes from the organizational level to the public level. In parallel, it was observed that the union between cleantechs' dynamic capabilities and their eco-innovations allows eco-innovations to explore green fiscal policies to facilitate technological implementation that can have socioeconomic and environmental effects on infrastructure and society.

5. RESULTS AND DISCUSSIONS

Discourse analysis showed the incidence of the categories and their relevance in the thematic evaluation of the cases studied. Figure 1 presents a graph of the categories with the highest incidence in the thematic block of the research, providing the main results of the themes addressed throughout the work.

Figure 1: Categorical Incidence Chart



Source: Prepared by the authors

The interviewees demonstrated during the research that Eco-innovation is present in the organizational processes and product creation of Cleantechs, reflecting itself as the largest block of categorical incidence. The block totaled a sample of n= 65, indicating from Figure 1 that Socioeconomic Stability (n=24) is the main pillar for Cleantechs to address their solutions to obtain benefits associated with public and fiscal policies. As well as sustained research developed the governmental, social and business scope and are elements belonging to the development of eco-innovations, government

incentive policies and investment decisions (Kobarg et al. , 2020; Owusu & Asumadu-Sarkodie, 2016). The interviewees mainly highlighted access to investments and solutions that could provide with the mitigation of impacts on the environment, balancing resource stability (n=22) and ecological stability (n=19), from energy efficiency solutions using technology and digitization capabilities that appropriate the Internet of Things, Artificial Intelligence and even manufacturing solutions for recycling cycle optimization. Corroborating the studies of (Fussler & James, 1996) demonstrates thestability of *resources* as the conscious use of natural resources and their availability and identified the concepts of the circular economy and the creation of new renewable technologies (Karjalainen & Heinonen, 2018; Dalton & Gallachóir, 2010; From Noronha, 2022c; Sikdar, 2022; Long & Liao, 2021.)

On the other hand, the second block with the highest categorical incidence is the Dynamic Capabilities Block (n=55). This block demonstrated that the Cleantechs interviewed use the dynamic capabilities to adapt to the market segment they are working on and to raise ways to generate eco-innovation. *Sensing* (n=23) was the category with the highest incidence, because the interviewees reported on market opportunities related to the use of renewable energies, use of smart sensors and other technologies that explored the creation of digital solutions generating benefits for business and society. Studies point out in their studies that from the perspective of wind energy the ability to stimulate *the use of renewable energies capture (sensing*) and apply (*seizing) each new* capability is an important skill for companies (Oji & Weber, 2017; Lima et al., 2020; Noronha et al., 2022). In parallel, the ability to adapt the business model and reconfigure to industrial demands were fundamental, because for the use of regulatory policies that enabled technological business, tariffs and tax reduction of charging and distribution and transmission of energy were mentioned, allowing the viability and reconfiguration of cleantechs in the solar energy and energy efficiency sector to exploit the benefits of green public policies (*Reconfiguring* - n=14). In this perspective, the interviewees highlighted that the organization's planning to extract the benefits of public policies is a capability that is directly linked to *the articulation of Seizing* (n=23), because it allocates the organization's knowledge to generate necessary ecoinnovations that can contemplate the fiscal and green benefits, in addition to the value of the environmental and social attributes provided by businesses that use lower water volume, renewable energy or materials that can be recycled. And ina larger proportion (such as a national economy, for example), dynamic capabilities when applied to renewable energy projects should target the country's incentive policies. Brink, 2019 mentions that energy companies operating in the national *sector need to reconfigure strategic*processes according to what happens to the national economy.

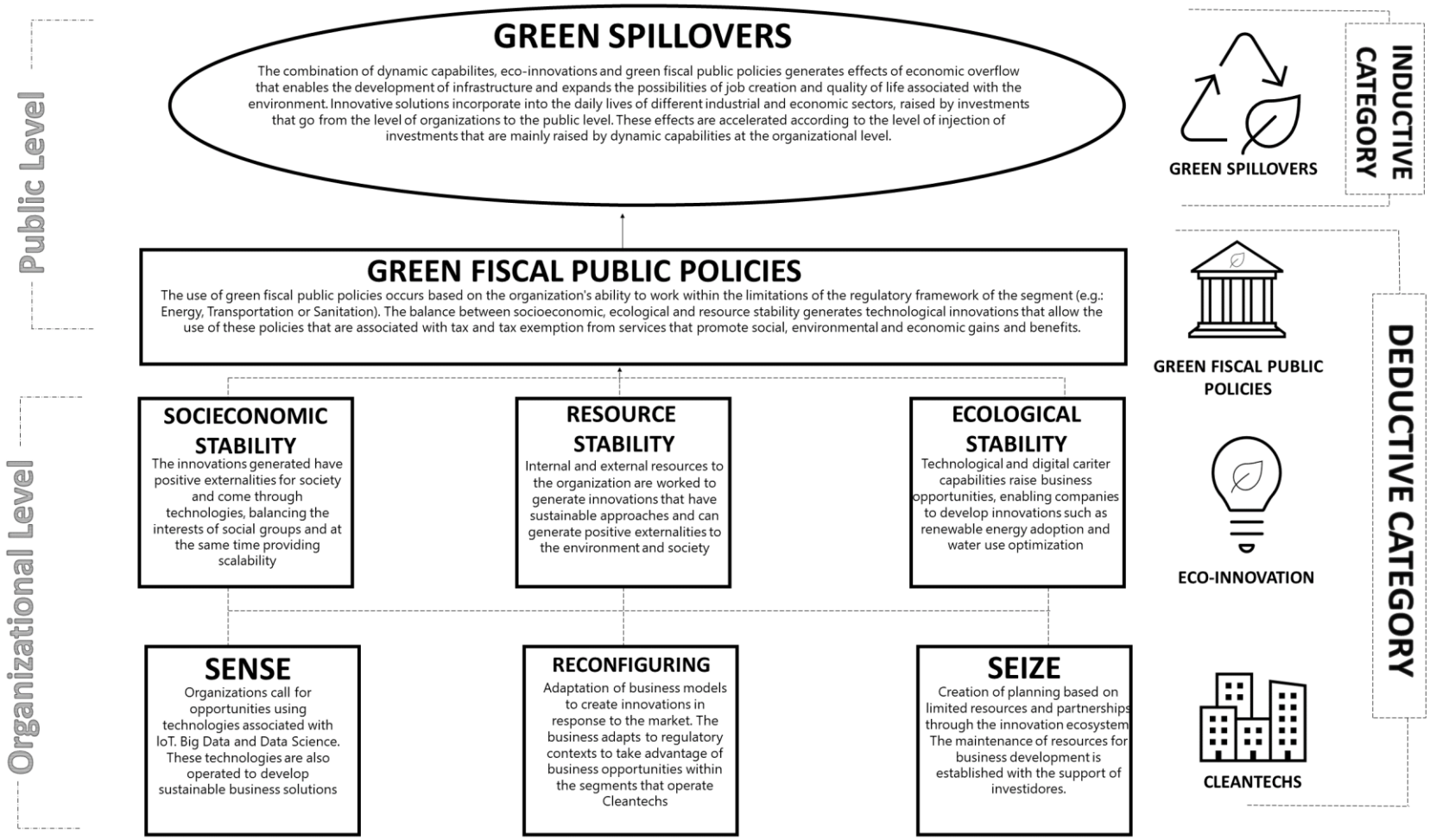
The Green Public and Fiscal Policies block was the third block with the highest categorical incidence (n=21). The interviewees mainly highlighted benefits and tariff exemptions for the viability of their business models. Exemptions associated with the import of products involving the supply chain and solar energy, discounts on the distribution and transmission tariff, and the need to value attributes provided by the technologies used were verified. The interviewees also stressed that these technologies

combined with better use of energy resources, sanitation and logistics infrastructure can provide jobs and boost GDP growth. However, for this to occur, the interviewees' experiences indicated that in addition to technology, it is necessary that the company's capabilities can reflect social benefits to policy-ers and that the policies practiced contemplate the entrepreneurial sphere for its continuous development of innovations that generate multiplier economic benefits (e.g. reforestation, job creation, support infrastructure, renewable energies). Studies mention that *"the use of government expenditures and taxes to influence the economy" defined by the IMF International* Monetary Fund allowing the government to use public finances from taxes encourages the economy and foster the adoption of green technologies (eco-innovation), boosting climate change mitigation waste management and promoting the sustainable use of natural resources by companies (Horton & El-Ganainy, 2012; Gramkow & Anger-Kraavi, 2018.)

The Emerging Category block presented a categorical incidence sample of n=16, and the main direction was *green spillovers* that appeared as findings and unfolding of technological innovation solutions that can be used for policy formulation. The interviewees reinforced that the solutions that expand the possibility of using renewable energies and better sanitation conditions allow the creation of new jobs and social projects, and should be the target of public policies. These points were highlighted as spillover effects for the economy and that need to continue to be contemplated in so that existing technologies reach maturity levels for the creation of social and environmental opportunities in existing production chains. The interviewees reinforced throughout the interviews that policymakers should note that Cleantechs have the capabilities to collaborate with sustainable development and alignment on environmental goals, but stimulating entrepreneurship and innovation should be part of regulatory agendas that tend to encourage and drive the adoption and dissemination of technologies such as the Internet of Things, Artificial Intelligence, Blockchain to improve sectors such as: Energy, Sanitation and Transportation.

The results showed that dynamic capabilities are a preliminary basis for the development of eco-innovations in Cleantechs and the results corroborated the literature. However, in this way, in case of these Eco-innovations, to exploit the social benefits of green public and fiscal policies, it is essential that these Eco-innovations generate overflow effects from economic benefits associated with the generation of jobs and reduction of impacts on the environment. In parallel, it is highlighted that policy formulation should view cleantechs' decentralized innovation movement as a technological step for sectoral sustainability, and evaluate the structuring of regulatory frameworks that can collaborate with a competitive environment and opportunities for infrastructure advancement at the national level. Figure 2 summarizes the results presented in this section.

Figure 2: Relationship between Dynamic Capability and Eco-Innovation Generation for the development and use of Green Public-Fiscal Policies



Source: Prepared by the authors

6. FINAL CONSIDERATIONS

The results of the study indicated that the incidence of categorical blocks is associated with the context of Cleantechs, so that dynamic capabilities can generate innovations in the organizational scope to enjoy the use of green fiscal public policies. Thus, the objective of the work that tried to investigate the impact of Dynamic Capabilities in the construction of Eco-innovations for the use of Green Fiscal Public Policies in the context of Cleantechs, was widely attended, evidencing from the interviewees' discourse and categorical incidence that Cleantechs envision the use of green public policies based on sectoral technological solutions that provide some innovation within energy, sanitation and transportation segments.

Some of the organizations interviewed demonstrated that green fiscal public policies are not in the organization's strategic and prior planning. However, they understand the importance of social benefits and address digital and technological solutions that can be contemplated based on the structuring of the business model of companies. To this end, these organizations should focus their efforts on the unification of technology platforms that use renewable energy and knowledge to provide support to national infrastructure, reversing the benefits of innovation in society for the broad use of existing public policies in general.

Additionally, as a result, *the emerging category of "Green Spillover"* demonstrated that organizations work their eco-innovations and capabilities to not only leverage, but provide guidelines for the formulation of regulatory policies, which results in positive effects on job creation, labor training and access to infrastructure (e.g. clean and cheap energy and sanitation). It is also noteworthy in the interviews that Cleantechs have the capillarity to generate decentralized innovations that directly corroborate social gaps and should be considered for vertical development of green public and fiscal policies. Moreover, the literature already directs that "*Green Spillovers*" can occur through the transfer of sector knowledge in organizations that invest for the continuous development of sustainable and ecological innovations (Long & Liao, 2021, Sikdar, 2022; Lima et al., 2020).

The scientific contribution of this work is to present that Cleantechs dynamically operate their capability to generate innovations that have a technological and sustainable character (Lima et al., 2020). These technological innovations within business models are a key object to take advantage of green fiscal policies that spill *over economic and environmental benefits (Green Spillovers* linked to reducing environmental impact, generating jobs, increasing quality of life and other factors to infrastructure sectors such as energy, sanitation and transportation (Noailly & Shestalova, 2017).

The practical contribution implies the prior and strategic planning of clean technology organizations for the use of public policies in general. According to the interviewees, not all companies found their business models to enjoy green fiscal public policies, however, during their operations they contemplate possibilities to optimize their business. In this sense, the contribution of this work is associated with the fact that companies should structure their strategic planning considering ecoinnovations fostered by capabilities that envision in advance the conjuncture of the regulatory framework of green public and fiscal policies.

6.1. Suggestion for future research and Work Limitations

The main limitation of the research is associated with the scope restrictions of a multiple case study with discourse analysis. The selected cases reflect sectoral results that, even minimized from the creation of a research script, were noticed during the interviewees' statements. For this purpose, categorical incidence techniques were used to avoid discursive tendencies. However, researchers need to deepen other qualitative techniques to map the association of organizations with green fiscal public policies. It is suggested that researchers use ethnographic techniques with deepening of field research, in order to monitor the details of the structuring of business models in the planning process of Cleantechs organizations.

It is suggested that researchers use theoretical lenses associated with the institutional environment to understand how this environment solidifies capabilities that allow exploring the different public policies and regulatory gaps, since entrepreneurs signal that organizations must guide strategies for the use of green public policies from the beginning. Additionally, it is suggested that these theoretical lenses are from the fields of public administration, law and economics, aiming at alignment with the context of technology-based organizations.

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