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THE ROLE OF FOREIGN DIRECT INVESTMENT FOR THE DEVELOPMENT OF INNOVATIVE CAPABILITIES IN THE BRAZILIAN OFFSHORE WIND ENERGY INDUSTRY

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ABSTRACT

Objective: To propose a model that identifies how Foreign Direct Investment (FDI) drives the development of Dynamic Capabilities (DC) to generate Innovation Capacity (IC) in the Brazilian offshore wind energy industry. **Method:** This is a qualitative case study research conducted with snowball sampling from 32 semi-structured interviews of 26 companies acting in the offshore wind energy industry. Content analysis was used to analyze all the data collected. **Main Results:** Our analysis revealed that FDI drives dynamic capabilities to generate innovation capacity and pointed out new categories (findings) such as Diffusion of Technological Innovation, Institutional Void, and Triple Helix for innovative technology development in the offshore wind energy industry. **Relevance / Originality:** This study's major contribution relies on a contextual articulation between FDI, dynamic capabilities, and innovation capacity applied to the context of offshore wind energy companies and their development in the market. **Theoretical / Methodological Contributions:** We present a new model for literature articulated in FDI and dynamic capabilities generating innovation capacity, elucidating the originality of our findings through the presentation of new categories to examine the offshore wind industry, including Diffusion of Technological Innovation, Institutional Voids, and Triple Helix. **Social / Managerial Contributions:** FDI articulated by institutions to generate the adoption of new technologies at the institutional, organizational, and regulatory levels that can fill institutional voids through an innovative and technological ecosystem.

INTRODUCTION

New energy production technologies have been at the center of the debate regarding the advancement of organizations' strategic innovation, international investments, and renewal of energy matrices in emerging economies (Rocha, Moreira, & Silveira, 2017; Mahbub & Jongwanich, 2019; Noronha, Benfatti, Themoteo, and Gannoum, 2021a). Among these new technologies, offshore wind energy has gained the attention of professionals in the energy field from markets all around the world (Brink, 2019; Noronha et al., 2021a). This type of energy source has expanded its installed capacity worldwide and continues to grow constantly, attracting interest from economies that aim to diversify their electrical renewabili-

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ty, garnering interest from different foreign investors looking to innovate and fill in regulatory gaps found in developing markets (García Márquez, Villasalero, & Pinar Pérez, 2011; Li, Gallagher and Mauzerall, 2020; Azam & Haseeb, 2021).

Research agendas have demonstrated that Foreign Direct Investment (FDI) can provide a range of economic effects that stimulate innovations in developing economies, corroborating with the structuring of entrepreneurial capabilities for firms to adapt to different market contexts (Meyer, 2003; Rocha et al., 2017; Mahbub & Jongwanich, 2019). Recent studies (Noronha et al., 2021a) highlight that FDI plays an important role in stimulating organizational technology transfer through capabilities, aiming to meet infrastructure demands related to energy, transportation, aviation, and sanitation sectors (Brink, 2019). In developing countries, these specific infrastructure demands are advantageous business opportunities that can be targeted by organizations' innovations directly through FDI (Ferreira, 2019; Mahbub & Jongwanich, 2019; Azam & Haseeb, 2021; Noronha et al., 2021a).

This contemporary context involving FDI and its opportunities, already identified on the organizational level, is directly related to innovation and its role in articulating capabilities (Li et al., 2020). Many researchers in the field have already emphasized that firms' Dynamic Capabilities (DCs) have the role of orchestrating tangible and intangible resources to create innovative, competitive, and sustainable environments, visualizing offshore wind energy technology (Brink, 2019), oil and gas (Shuen, Feiler, & Teece, 2014), and other clean technologies that can collaborate for innovation (Noronha, Longo, Ferraro, Melvin, 2021b).

Despite the vast evidence and research suggestions visualizing the articulation of the theoretical lenses of DCs and FDI, the role of FDI in articulating these capabilities to generate Innovation Capacity (IC) in institutions is yet to be understood. These novelties must be explored more in-depth, especially when it comes to understanding how this process can assist developing economies to exploit offshore wind energy technology (Brink, 2019) and other related clean technologies (Noronha et al., 2021b), in the context of creating a competitive and booming emerging market such as the Brazilian one, as pointed out by Noronha et al. (2021a).

Thus, this article seeks to frame the phenomenon of the creation and structuring of the offshore wind energy market in the Brazilian context, considering the challenges mentioned above that can be overcome through FDI and the ability of organizations to articulate their DCs for the creation of innovation capacity. With that, these organizations can aim to cover gaps at the regulatory, productive, and organizational level, fostering new paths for research agendas and direction for future studies related to the offshore wind energy sector in other developing markets (Brink, 2019; Mahbub & Jongwanich, 2019; Li et al., 2020; Noronha et al., 2021a; Noronha et al., 2021b).

Based on the aforementioned contextualization presented, the primary research question this study will answer is: "How can FDI drive the development of DCs to generate innovation capacity in companies in the offshore wind industry?". To address the research question, we propose a model that identifies how Foreign Direct Investment drives the development of Dynamic Capabilities to generate Innovation Capacity in the Brazilian offshore wind industry.

The research gap of the paper follows the suggestions for future research from the studies of Brink (2019), Rovere, Miranda, Lima, and Santos (2020), and O. Khan et al. (2021), highlighting that offshore wind energy industries in the global context need to be investigated based on theoretical perspectives that complement studies on capabilities and their orchestration for innovation. Complementarily, related studies by Rocha et al. (2017) and Mahbub and Jongwanich (2019) emphasize the need to verify the role of FDI as an antecedent and determinant for resource and capability articulation, particularly considering energy and renewable energy markets in developing countries.

Modern research focused on offshore wind energy, innovation capabilities, and foreign direct investment covers the current scenario of countries developing this type of technology, such as Brazil and other Latin American countries. Moreover, the insertion of new energy sources is directed by the sectorial plan for the mitigation of climate risks and sheds light on the previous demand for a regulatory, environmental, and economic framework to start the operationalization of this resource. Thus, it is relevant to investigate the context under the theoretical lenses of the innovation capacity of emerging markets, putting a parti-

cular focus on innovation based on the orchestration of resources and capabilities, enabling further related research and development of this field through institutional entities and the academic community.

The major scientific contribution of this study is a novel theoretical model applied to emerging markets, which suggests the management of foreign direct investment through organizational capabilities operationalized in a strategic context that targets institutional and regulatory innovation (Brink, 2019; Mahbub & Jongwanich, 2019; Noronha et al., 2021a). The various impacts of FDI in light of the offshore wind industry explored in this paper helped us identify pathways for a regulatory framework that can cover institutional gaps by exploring new technologies and the relationship between the business ecosystem and sectoral innovation.

Furthermore, the model proposed here fills literature gaps by identifying advancements that contribute to the most relevant literature in the field (Brink, 2019; Mahbub & Jongwanich, 2019; Noronha et al., 2021a) and novelties linked to the adoption of new technologies as a result of the articulation of the fundamentals of FDI, dynamic capabilities, and innovation capacity applied to the offshore wind energy context (*e.g.*, production of hydrogen and green ammonia). Additionally, the results presented here can also help cover institutional gaps, especially regarding the relationship between business and innovation ecosystem, strengthening the foundations that support the structuring of institutional and regulatory policies for the creation of a consolidated value chain from FDI and innovation-focused organizational capabilities, as already elucidated in the studies of Brink (2019) and Rovere et al. (2020). These contributions positively impact the growth of the research field focusing on FDI, DCs, and ICs, presenting new theoretical lenses for the formation of a competitive and innovative environment in the wind sector. They also reinforce the role of dynamic capabilities of economic agents and FDI in structuring a modern framework for emerging markets that target wind energy and new complementary technologies.

The practical contributions related to management highlight that FDI articulated by institutions can boost the adoption of technology in the institutional, organizational, and regulatory scope, filling institutional gaps through an innovative and technological ecosystem and subsidizing the paths for organizations in the sector. On the other hand, foreign investment can allow the tropicalization of the technological infrastructure of the Brazilian energy sector, in a parallel occurrence to the diffusion of technological innovation, enabling solutions for the industry based on research, development, and technology combined with government entities and universities.

1. THEORETICAL FRAMEWORK

In order to analyze the aforementioned research phenomenon and its context, this article brings theoretical foundations based on the following key concepts: FDI, DCs, and IC from a resource-based perspective. The foundations were treated on categorical bases considering sub-concepts that served to structure the propositions presented in Section 2.

1.1. Foreign direct investment as a vector of resource orchestration

FDI can be defined as a particular form of investment across geographic borders (Duce & España, 2003; Ross, 2019) from a country of origin to a country of interest that seeks to foster capital (Denisia, 2010; Paul & Feliciano-Cestero, 2021). In this context, a direct investor is an individual, a public or private company, a governmental institution, or any entity that has an interest in investing in a country other than where the company's main headquarters are located. The main requirement to be considered a FDI is the actuation of an international related company that exercises control over some local subsidiary (Duce & España, 2003; Park & Tang, 2021; Paul & Feliciano-Cestero, 2021).

It is important to consider that FDI can offer relevant advantages such as greater exports, access to international markets and currencies, solid sources of financing for new technologies, and a solution to replace bank loans (Denisia, 2010). Furthermore, it is a vector for job creation, high productivity, competitiveness, and technology spillovers, especially for developing countries (*e.g.*, Brazil, Russia, India, and South Africa) and emerging markets (Meyer, 2003; Azam & Haseeb, 2021).

In line with the current scenario of multinationals and their economic productive capacity (Azam & Ha-

seeb, 2021; Paul & Feliciano-Cestero, 2021), many organizations have been attempting to reshape their investments and verify the positive effect they can have on the company's growth. Some motivations might be behind this shift of behavior, including more technology; capital; assets; managerial capabilities; technical skills; and access to other markets, resulting in the exchange of experiences, entrepreneurship, productive capacity, and innovation among different companies and countries involved in the process (Carminatti & Fernandes, 2013).

The present study is relied on the approaches addressed by Duce and España (2003), Meyer (2003), Denisia (2010), and Azam & Haseeb (2021) who verify FDI from the perspective of the following categorical concepts: Capital Flow, Spillovers in domestic economy, Technology Transfer, and Absorptive Capacities. Categorical concepts are dealt with in detail in the paragraphs below.

The *Capital Flows*, *outflows,* and *inflows* of financial resources can happen both within a country and internationally. Investment flows are commonly presented on a net basis (credits from capital transactions minus debits between direct investors and their foreign affiliates) (Rocha et al., 2017). Foreign capital inflows can promote environmentally sustainable economic development and also relates to infrastructure goals set by different governments across the globe (Azam & Haseeb, 2021). In an environment of high energy demand and production expansion, FDI is considered a form of capital flow across borders to promote further infrastructure growth and technological development (Denisia, 2010; Azam & Haseeb, 2021). In the process of foreign capital inflows, there are:

- net inflow, which is the amount of inward direct investment made by investors who do not inhabit the reporting economy;
- net outflow, which is the amount of direct investment made by the inhabitants of the reporting economy to external economies (Rocha et al., 2017).

Capital inflows drive infrastructure advancement in developing economies by enabling the direction of investment flows to transportation, energy, sanitation, and health sectors (Ross, 2019; Azam & Haseeb, 2021; Gupta, Yadav, & Jain, 2022).

The interaction between domestic and foreign companies enables a system of spillovers in the economy (Paul & Feliciano-Cestero, 2021). Spillovers arise from the interaction of multinational firms with local actors and are associated with impacts on adjacent sectors that result in solid changes in a country's infrastructure and political, societal, and economic frameworks. Spillover effects through FDI can increase the demand for goods, thus allowing local suppliers and investors to achieve economies of scale (Meyer, 2003). According to Paul and Feliciano-Cestero (2021), spillovers also arise from the relationship between parent companies and their subsidiaries, boosting the exchange of knowledge between international units as well as favoring innovation that can be used to solve infrastructure bottlenecks.

Technology Transfer is the process of sharing information related to scientific and technological knowledge, which can be protected or not, and developed for companies by scientific, technological, and innovation institutions (Chiarini, 2014; Park & Tang, 2021). Through FDI, this process can occur in two ways: vertically or horizontally. Vertical transfers occur when a technology is transferred from a foreign company to its subsidiary. On the opposite hand, horizontal transfers happen when the transfer extends to other domestic companies and, on some occasions, even to competing companies, promoting the exchange of knowledge and technology (Chiarini, 2016). In addition, technological transfers through FDI between emerging economies can trigger a process of reconfiguration of regulatory models to accommodate infrastructure and empower local labor in countries that are gradually structuring their economic scenarios (Park & Tang, 2021).

Absorptive Capacity can be described as a firm's ability to value, assimilate, and apply new knowledge (Cohen & Levinthal, 1990; Chengying, Wang, Shah, Chang, & Zhou, 2021) and can be built by an amalgamation of four types of knowledge dimensions through which firms establish a dynamic organizational capacity (Zahra & George, 2002). These dimensions are knowledge acquisition, knowledge assimilation, knowledge transformation, and knowledge exploitation. Knowledge acquisition is an institution's ability to value, identify, and acquire external knowledge critical to its operations (Cohen & Levinthal, 1990). Knowledge assimilation refers to the ability to analy-

ze, process, interpret, and understand information obtained from external sources (Todorova & Durisin, 2007). Then, knowledge transformation is the act of recognizing seemingly inadequate sets of information and then restructuring them to create a schema (Zahra & George, 2002). Finally, knowledge exploitation is defined as the ability to refine, expand, leverage, and create existing competencies (Todorova & Durisin, 2007). Furthermore, scholars who study FDI in the modern interpret absorptive capacity as a means for the exchange of information and knowledge between nations and an intermediary concept for the generation of spillover effects in international economies (Gupta et al., 2022; Yu, Zhang, Zhang, & Fan, 2022).

1.2. Dynamic capabilities and the technological approach

Teece (2018) clarifies that dynamic capabilities are the organizational skills that enable a firm to use information to reconfigure its acquisitions and integrate novelties to build business models. Teece, Pisano, and Shuen (1997) pioneered studies around DCs, and since then, researchers have continued to add important concepts to the literature on this field, with a particular focus on understanding how firms combine resources from internal and external use to keep growing. According to Teece (2007), this development process happens primarily through strategic learning focused on all the stages necessary to first understand new competencies and then adapt them to the dynamics of the corporate environment. Regardless of the differences that occur in these processes based on the nature of each business and the fundamental niches they complement, dynamic capabilities allow companies to create and capture resources that can add value to their ecosystems to facilitate the creation of a model that is appropriate for a functional corporate dynamic (Teece, 2018; Brink, 2019; Noronha, Bento, Rufino, & Rocha, 2022). Helfat and Raubitschek (2018) complement this thought by validating the idea that DCs are essential not only for value creation, but also for a more embryonic stage of the process: the capture of those values that lie in the hand of company leaders.

To better understand DCs, it is necessary to examine the origin of studies within this scope and understand how they are used in the development of new resources and competitive advantages that integrate these capabilities (Shuen et al., 2014; Helfat & Raubitschek, 2018; Teece, 2018). Teece (2017) clarifies that it is not possible to look at DCs without leaning on Resource-Based View (RBV), which states that these resources must be extremely rare and unique in order to be considered an advantage within the industry. Without these features, it would be impossible to use any resource as a way to leverage a business model and improve the framework of some business processes. In other words, the challenge lies in effectively articulating dynamic capabilities to build a competitive edge (Teece & Leih, 2016; Teece, 2017; Brink, 2019).

Furthermore, dynamic capabilities have become essential for studies and business cases that occupy different industries and develop from different structures. Mousavi, Bossink and van Vliet (2018) clarify that, while these capabilities have forced companies to transform and embrace more changes within the technological context, these transformations boosted by technology can happen either in subsidiary companies, inside or outside the energy industry, in small or large franchises, or even in startups (Teece et al., 1997; Teece & Leih, 2016). As such, these capabilities become an essential tool for companies to establish themselves in an uncertain and volatile market and renew their models and competencies in order to allocate resources and invest in their competitive advantages (Ambrosini, Bowman, & Collier, 2009).

To effectively address the technological context of this paper, we will rely on the approaches of Teece (2007), Teece and Leih (2016), and Teece (2017). These authors propose that technology cannot be separated from the strategies that firms adopt to stimulate and renew their resources and explain that there are three guiding principles for this process to be complete and, thus, represent a competitive advantage: sensing, seizing, and reconfiguring. These three principles will be discussed below and treated as categories of analysis in this study:

- Sensing: refers to the ability of a company, leader, and/or entrepreneur to recognize threats and opportunities related to technological aspects (Teece, 2007). At this point, it is necessary to discuss strategies to act according to the rhythm of technological development and gather opportunities through it. The first step is to mature the per-

ception of the needs of the company itself and its customers. Next, it is necessary to evaluate how technologies can be directed to opportunities to leverage business in a way that dialogues with these needs;

- Seizing: is defined as the appropriation of resources to express the needs and opportunities detected in the previous stage (Teece, 2007). At this point, these resources are used to generate value, develop the organization, predict strategies to handle competing companies, and protect the new intellectual properties of the business. (Teece, 2014; Borges & Machado, 2019). This process of reallocation of resources paves the way for innovation in business routines, services, products, and internal processes;
- Reconfiguring: is the continuous transformation process within the scope of business dynamics. This transformative process is handled by managers and results in the renewal and/or modification of some essential aspects of the business (Teece, 2007). For this to happen, managers and leaders must articulate the resource base to delineate new strategic processes that are efficient and innovative, which ultimately highlights the role of these professionals within this cycle (Teece, 2007). This reconfiguration process also aims to increase profit, enable the creation of new products, and boost the efforts placed on the weaknesses of the business so that the company develops new competencies.

1.3. Innovation capacity and the organization's perspective

IC is defined by Zhang, Garrett-Jones, Szeto (2013) and Lopes, Oliveira, Silveira, Farinha and Oliveira (2021) as the mobilization of a firm to create products and achieve market performance. The concept proposed by Zhang et al. (2013) is rooted in Schumpeter's (2017) theoretical lens on the need for industries to change their designs and manufacture new products. This specific concept also resembles the research of Kogut and Zander (1992), Lawson and Samson (2001), and Dogbe, Bamfo and Pomegbe (2021), the way these authors defined IC as a firm's ability to mobilize ideas and knowledge and transform them into new products, processes, and systems with an enterprise resource-driven approach.

The origin of IC studies emerges from RBV, but this research field is not limited to this theory only, despite being one of the main factors arising from organizations' dynamic capabilities (Wang and Ahmed, 2007; Alnuaimi, Singh & Harney, 2021; Lopes et al., 2021). Thus — since innovation contributes to the acquisition of competitive advantage —, firms should strengthen their ability to generate such innovations through internal and external resources, aiming at creating new opportunities to efficiently exploit the resources available in developing economies (Henderson and Clark, 1990; Teece et al., 1997; Swink, 2006; Lopes et al., 2021).

Among the different approaches to innovation capabilities, one of the most noteworthy models was proposed by Smith, Busi, Ball, and Meer (2008) and Vasconcelos (2008). For Smith et al. (2008), innovation capacity depends on several factors, people, and activities that enable the innovation process. Similarly, the model proposed by Vasconcelos (2008) highlights internal elements such as strategy and management as crucial parts of the innovation process.

Another important model to analyze innovation in organizations was formulated by Tang (1998), who proposed that innovation in products and processes is determined by factors that are immersed in a favorable internal environment. Tang (1998) claims that an organization provides innovation by exchanging information and communication in the external environment. In accordance with the perspective brought by Vasconcelos (2008), this model highlights the systemic view and the relationship with the external environment, emphasizing behavior and knowledge management, concepts that align with the definitions of innovation capacity.

The varied perspectives in the literature about IC carry several elements in common (Tang, 1998; Wang and Ahmed, 2007; Smith et al., 2008; Vasconcelos, 2008; Novillo-Villegas, Ayala-Andrade, Lopez-Cox, Salazar-Oyaneder, & Acosta-Vargas, 2022). In this paper, categorical concepts will be emphasized according to Valladares, Vasconcellos, and Di Serio (2014), who consolidate the main views shared by scholars in the field and determined that the fundamental perspectives of CI in organizations are: People Management for Innovation, Project Management for Innovation, and Strategic Technology Management.

The concept of People Management for Innovation is linked to practical studies of organizational culture and social structures and reflects the autonomy acquired through leadership and how it impacts the relationship with employees, promotes freedom to innovate, and gives room to new, challenging goals that can be achieved by compiling different ideas and knowledge (Amabile, Schatzel, Moneta and Kramer, 2004). Additionally, managing people for innovation can influence the dynamism of organizations by promoting resource utilization for organizational sustainability in developing economies (Lopes et al., 2021).

On the other hand, the idea of Project Management for Innovation is articulated from the perspective of innovation capacity in the provision of new resources and also in the analysis, planning, and execution of innovative products and processes (Rothwell, 1994; Cooper & Kleinschmidt, 2007). Furthermore, Ferreira (2019) cites the importance of this process in acquiring financial resources to enable the operation, assembly, and construction of offshore wind farms, as well as technological differentials that may attract new investors.

According to Valladares et al. (2014), Strategic Management of Technology consists of the elaboration of strategies aimed at the development of new technologies. Ferreira (2019) adds that innovation guided by capabilities and coming from strategic management is applied to the development of new solutions for renewable energy markets (*e.g.*, offshore and onshore wind energy).

2. CONCEPTUAL MODEL: RESEARCH PROPOSITIONS

2.1. Foreign direct investment and organizational dynamic capabilities in the energy sector

After conducting an extensive literature review, we concluded that data on FDI flows in developing countries with emerging markets play an essential role in transferring technologies through their linkage to energy sector production chains, fostering the construction of renewable energy infrastructure (Mahbub & Jongwanich, 2019; Azam & Haseeb, 2021). Capital flows, in addition to encompassing the definitions of the theoretical lens of this paper, give organizations the ability to exchange capabilities and resources for their financial management in multinationals in the infrastructure sectors (Rocha et al., 2017; Ross, 2019; Azam & Haseeb, 2021; Gupta et al., 2022).

From the perspective of organizations and institutions, scholars have presented evidence to articulate that FDI can lead to competitive advantage, even in emerging markets, through the transfer of capabilities for industrial competitiveness (Meyer 2003; Teece, 2014). Furthermore, a firm's absorptive capacity stimulates knowledge management, facilitating the creation of an ecosystem conducive to meeting the regulatory expectations of markets in the making, visualizing the development of technological innovation in energy markets enabled by foreign capital flows (Zahra & George, 2002; Shuen et al., 2014; Khan, Yu, Belhadi, & Mardani, 2020; Rovere et al., 2020; Noronha et al., 2021b).

However, some scholars have pointed out a particular need to understand the role of FDI and the driving of dynamic capabilities in new energy industries (Shuen et al., 2014; Teece, 2014; Khan et al., 2020; Rovere et al., 2020). In this sense, this paper delves into the suggestions presented by Mahbub and Jongwanich (2019) and Noronha et al. (2021a), who provided evidence that international financing through foreign investment can foster the development of organizational capabilities in developing markets. Taking this context into account, we consider the dynamic capabilities in organizations directly linked to FDI and propose: Proposition 1: FDI drives the development of dynamic capabilities in organizations in the offshore wind energy sector.

2.2. Dynamic capabilities and the drive of innovation capacity through foreign direct investment

Scholars in the field have commonly associated DCs with IC studies (Tang, 1998; Wang and Ahmed, 2007; Smith et al., 2008; Vasconcelos, 2008). However, the relationship between these concepts with FDI, different technologies in the energy sectors, and innovation management is yet to be explored in depth by modern researchers (Chiarini, 2014; Brink, 2019; Khan et al., 2020; Rovere et al. 2020; Noronha et al., 2021a).

According to Noronha et al. (2021a) and Noronha et al. (2021b), investments can boost the ability of cleantech and offshore wind companies to adapt to

technological contexts, taking advantage of industry opportunities and challenges from innovation and their business ecosystem. With a similar perspective, the authors Valladares et al. (2014) claim that to generate innovation capacity, organizations must articulate their management capabilities of people, projects, and strategies for technological innovation, hence strengthening the way they engage with new opportunities (Lopes et al., 2021; Novillo-Villegas et al., 2022).

In turn, the DCs arising from the entry of foreign capital into emerging countries enable innovation at an institutional and regulatory level within organizations. Taking into account the premises established in the theoretical framework presented above, Proposition 2 is rooted on the idea that dynamic capabilities drive the development of innovation capacity through FDI. Proposition 2: DCs developed through FDI enable the creation of IC in the offshore wind energy industry.

3. CONCEPTUAL MODEL OF PROPOSITIONS

This study suggests a new conceptual model of propositions to structure the hypothesis raised in the research under the theoretical references selected to observe the context of companies in the offshore wind energy sector. These propositions (Eisenhardt & Graebner, 2007) are hypothetical premises of qualitative research that can constitute a model based on concepts cited and articulated by other scholars, visualized from the case studies, and that can be tested and validated. Refer to Figure 1 below for the details of the conceptual model investigated within this research context.

4. METHODOLOGY

4.1. Approach

This study adopted a qualitative methodology with a descriptive character to support our single-case study. The selection of a descriptive character is necessary due to the existence of a previous theoretical framework, guiding the selection of analysis categories, and allowing us to further explore the association of previous literature fundaments. Moreover, single-case studies are characterized by the emphasis on the context in which the phenomenon is inserted (Yin, 1994; Eisenhardt & Graebner, 2007) and through the exchange of information that can generate meanings in organizations (March, Sproull and Tamuz, 1991).

We have chosen to conduct a single-case study due to the specificity of the phenomenon addressed in the paper (Gustafsson, 2017). In comparison to a multiple-case approach that addresses multiple theoretical lines, single-case studies are focused on a particular phenomenon that is contemporary and directly dialogues with the theory proposed by the researcher (Gustafsson, 2017; Yin, 1994).

The main context explored by the single case study methodology is understood in great depth, allowing researchers to pose new questions and discuss new theoretical references. Moreover, Yin (1994) highlights that the case study methodology is an artifact to respond to the phenomena observed through the key questions "*How*" and "*Why*", which also dialogues with the aims of this research.

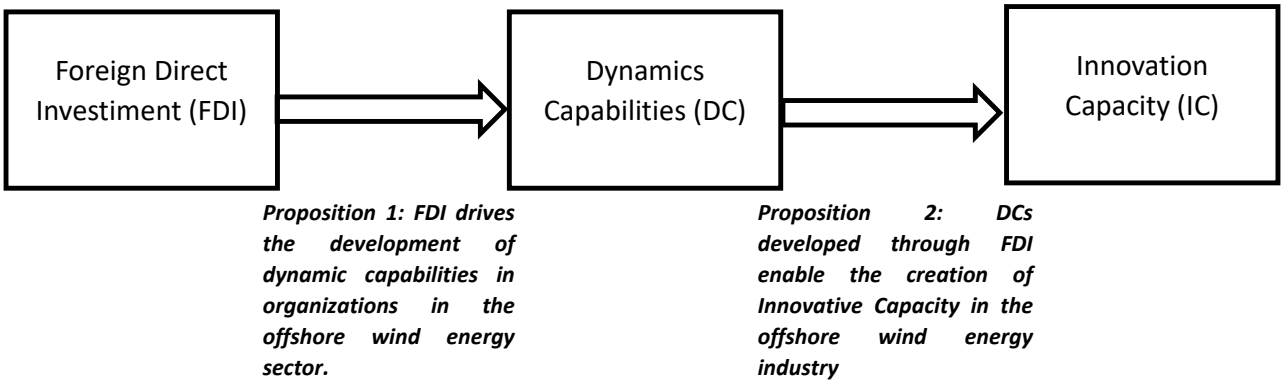


Figure 1. Conceptual model of propositions.

4.1.1. Steps of a single-case study

Conducting a single-case study requires some fundamental steps that determine a successful research protocol: Outlining the research objectives, structuring the framework and the concepts and/or categories, organizing the research script, conducting data collection, performing data analysis, and creating reports with the research results (Figure 2).

4.2. Research context: offshore wind energy, Brazilian market structure and companies

Offshore Wind Energy is a technology for generating electricity by wind turbines installed at sea by means of high-speed winds in the coastal region, thus, being able to generate more energy (Ferreira, 2019). The environmental agenda, energy demand, and the decentralization of non-renewable sources have made investments in the sector grow considerably (Noronha et al., 2021a; Turovets, Proskuryakova, Starodubtseva, & Bianco, 2021).

According to the Global Wind Energy Council (GWEC), in its Global Offshore Wind Report (Lee & Zhao, 2022), the worldwide installed capacity is around 57.2 GW of power in offshore wind energy. The new estimated values for the sector are: 235 GW installed by the end of 2030, ending in an installed capacity of 270 GW (Lee & Zhao, 2022). According to Noronha et al. (2021a), this amounts to a growth of 22% in relation to the past decade, presenting itself as a market in full development and with room for growth.

The Brazilian context stands out due to its huge capacity for energy generation, with 83% in renewable energy and 17% in non-renewable energy, spread over hydroelectric, wind, solar, biomass, small hydro, and other fields (ABEEólica, 2022) largely concentrated in coastal regions, comprising 12 states and 777 wind farms. According to the National Agency of Electric Energy, energy auctions held and the free market are likely to grow exponentially in the upcoming years.

The exponential development of the offshore market in Brazil might become a reality by solving the following challenges: accuracy of geographic data; improvements in port infrastructure (vessel fleets; navigation safety; environmental management of the maritime area); minimization of socioeconomic impacts; mapping of restricted areas; identification of new investments, among other issues that might be impacting the entire offshore industry chain and its context prepared for technological innovation (EPE, 2020).

4.3. Case selection criteria

Case selection was based on criteria that allow the application of the concepts addressed above (*e.g.*, DC, IC, and FDI) while observing the level of organizations and their impacts on social, environmental, and economic development through offshore wind technology. Based on this context, three sample selection criteria were outlined to filter the companies that participated in this research: representatives of organizations and institutions involved with offshore wind energy and foreign direct investments; representatives of organizations and institutions that receive investments and are involved in the offshore wind technology value chain; and representatives of

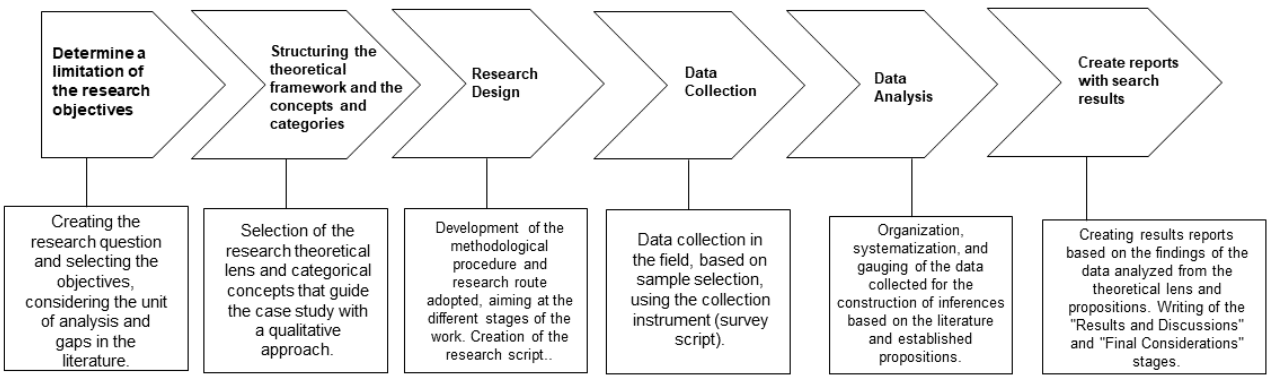


Figure 2. Flowchart of the research protocol.

organizations nominated by major institutions that have experience in international offshore wind energy markets.

4.4. Data collection, sample selection, and research saturation

The data used in this research was obtained through a series of semi-structured interviews conducted based on a previously designed research script. The script addressed questions related to the theoretical framework and the analysis categories included in the research. The schedule for data collection and production started in February 2021 and finished in April 2021.

In total, 32 interviews were conducted with 26 companies and institutions that directly or indirectly participate in the offshore wind field, including those involved with energy commercialization, construction, engineering, consulting and construction, logistics, assembly, and transportation, as well as manufacturers of large wind turbines, wind blades, parts, and components; federations; research institutes, universities, study centers, and entrepreneurs (developers and energy generators). In addition, to further validate the results of this research, representatives of embassies that promote international investment programs, local development agencies, and regulatory agencies were also interviewed.

The central feature of the companies' sample is represented by the founding managers, co-founders, and CEOs of the companies interviewed, aiming to understand the strategic positioning of these organizations concerning FDI and the factors generating innovation capacity inside these businesses. Regarding the other institutions, professionals linked to the energy field and involved in market regulation were complementarily interviewed to share their experiences and viewpoints as analysts and experts. After obtaining the authorization and guaranteeing the anonymity of the participants, the material was recorded and transcribed using programs for data analysis with the support of research software.

Research saturation was reached at the 14th interview, and the repetition of key viewpoints were identified among the institutions that were part of our research sample. Furthermore, the saturation point indicated that the accounts intersect, a conclusion supported by NVivo software after performing the manual validation of the transcripts (Fontanella, Ricas, & Turato, 2018). Although the research saturation point was reached at 14 interviews, a total of 32 interviews were conducted. It is worth noting that the total number of interviews is associated with the need to validate our conclusions regarding sample data saturation. The practice of validating the saturation number is commonly performed in qualitative research to decrease potential biases that result from using survey software and strengthen the accuracy of electronic data (Guest, Namey & Chen, 2020).

4.4.1. Snowball sampling and selection technique

The methodological route of this study relies on the snowball sampling technique, a sampling method that allows the use of personal reference networks characterized by groups with difficult access to the information the researchers need. In this way, researchers seek new contacts that allow the construction of a sample within the scope of the research. Additionally, it is a sampling technique associated with qualitative assumptions for selecting participants, and assessing the relationships and connections pointed out by the respondents involved (Naderifar, Goli, & Ghaljaie, 2017; Parker, Scott, and Geddes, 2019).

In the present study, the use of this sampling method is advantageous to create access to strategic business information (*e.g.*, from CEOs, managers, embassy representatives, and other executives) and to address the specificity of the market field being focused on. Furthermore, the costs to execute this methodology are low, and people are more likely to engage in research that is designed following this approach (Bockorni and Gomes, 2021).

As Vinuto (2014) clarifies, the initial step of this process relies on intermediation, which means people with specific and suitable profiles are indicated to participate in the study. Then, this group of people is also asked for new contacts that suit the same profile and are part of their own personal network, systematically enlarging the research sampling frame.

4.5. Data analysis: content analysis

To interpret the data collected for this study, we relied on content analysis, supported by NVivo sof-

tware. Content Analysis is a methodology that encompasses techniques that make it possible to examine qualitative data in an objective and systematic manner (Silva & Fossá, 2015). This type of analysis is based on the description of the content of a message and is often used to embody inferences based on content that leaves room for multiple possibilities and interpretations (Bauer & Gaskell, 2017).

The procedure adopted for the Content Analysis process was based on the studies by Mendes & Miskulin (2017) and includes the following steps:

- data schematization and exploration;
- division of categories (deductive and inductive) based on referential blocks;
- delimitation of analysis patterns;
- creation of tables, graphics, and visual schemes to illustrate data and results.

Figure 3 presents the blocks and categories identified from the transcripts of the interviews and outlines the repetitions observed by the NVivo software and their respective percentage in relation to the total value of repetition. The deductive categories were extracted based on the literature review from the theoretical references (blocks) around dynamic capabilities, innovation capacity, and FDI. On the other hand, the inductive categories are the ones that emerged (Emergent Categories) from the data analysis process, and their incidence of repetition was identified by the software. Graphic 1 illustrates the number of times the category was mentioned in the interviews.

5. RESULTS AND DISCUSSION

The section is subdivided and organized to better present the results with an in-depth analysis of each referential block, considering the deductive and inductive categories based on the transcripts reports and data regarding categorical repetition shown in Figure 3 and Graphic 1.

5.1. Foreign Direct Investment block

The FDI block (n= 92) represents 25.63% of the categorical repetition, starting from the investigation of the consequences of foreign capital in the offshore wind industry related to the readjustment of DCs in institutions (Proposition 1) and also covering the exchange of new knowledge generating innovation coming from this type of capital (Proposition 2). The specific categories in this block are: Capital Flow, Spillovers in the domestic economy, Technology Transfer, and Absorptive Capacities.

The Capital Flow (n= 20) category marked 5.57% in terms of categorical repetition and is visualized from the perspective of international monetary injection in Brazil (Meyer, 2003; Azam & Haseeb, 2021). In this context, the generation of innovation capacity is part of the increment arising from this capital flow. Furthermore, FDI and its flow intensify the regulation of the domestic market, favoring the renewable energy scenario. In parallel with the results obtained, the literature indicates that capital flows can be determinant for companies focused on the energy sector to be able to innovate through specific capabilities in contexts that lack regulations to accommodate technologies such as offshore wind or energy storage (Azam & Haseeb, 2021; Novillo-Villegas et al., 2022). This association matches our Propositions 1 and 2.

The Spillovers category in the domestic economy (n= 17) marked 4.74% in categorical repetition and is related to the effect of the FDI in boosting and generating employment and income from the interaction of domestic and foreign firms (Meyer, 2003; Paul & Feliciano-Cestero, 2021). Thus, it can be said that spillovers grow naturally through the flow of capital within the national economy, resulting in the growth of activities involving the offshore wind energy value chain and related training processes. Moreover, it is observed the association that the spillover effects corroborate to boost engagement in business sustainability, aiming at solutions such as social integration programs and support to the population and local infrastructure. This, in turn, carries socioeconomic attributes to the regions affected by the spillover effects of the technologies that receive FDI (Brink, 2019; Noronha et al., 2021a).

The Technology Transfer category (n= 33) marked 9.19% in categorical repetition, highlighting the exchange of foreign information and its role in the allocation of new experiences and the production of scientific knowledge (Chiarini, 2014; Park & Tang, 2021). Thus, it can be said that the flow of FDI in companies or subsidiaries that receive resources financed by FDI is adaptable to the national sector, determi-

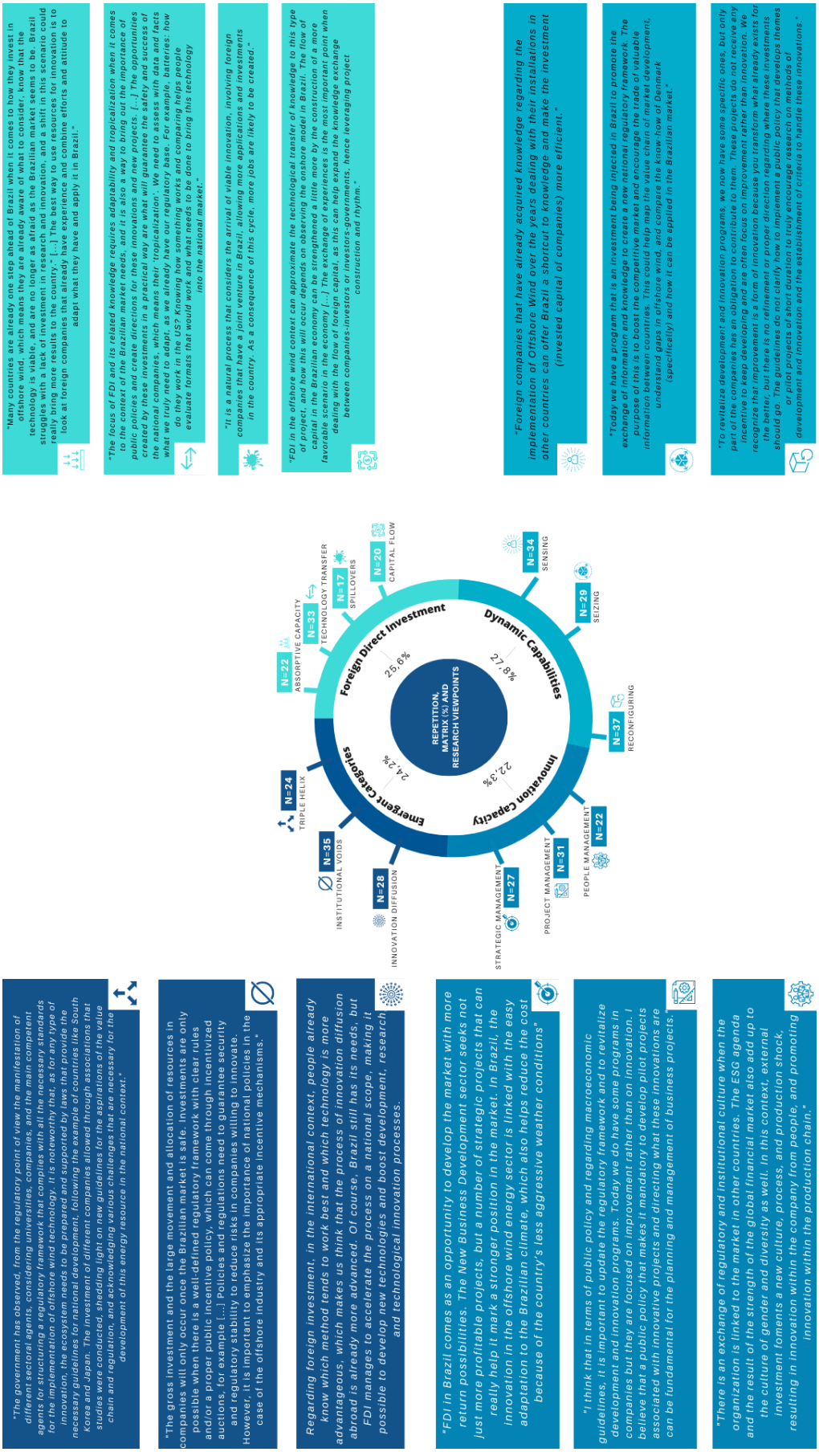
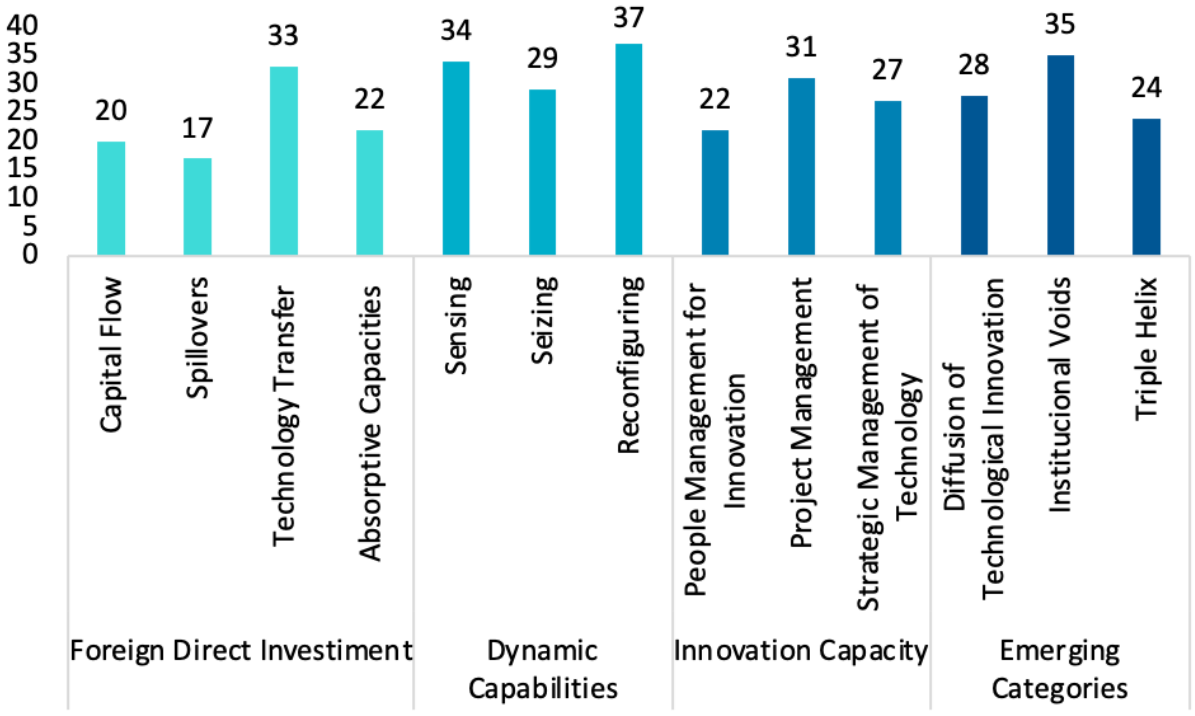


Figure 3. Repetition matrix and research viewpoints.



Graphic 1. Block *versus* repetition.

ning the tropicalization and technological adoption of this knowledge acquired in Brazilian companies. In addition, technology transfer through FDI promotes the gain of knowledge for developing markets so they can better structure production chains for new technologies (Chiarini, 2016). This transfer process also enables the exchange of international knowledge that can serve to build the value chain and regulatory guidelines of developing countries based on the knowledge of organizations with headquarters in stronger economies (Park & Tang, 2021).

The final category of this block, Absorptive Capacities (n= 22), marked 6.13% in categorical repetition, emphasizing the attribution or assimilation of knowledge coming from FDI, which connects firms and impacts their ability to absorb such knowledge (Cohen & Levinthal, 1990; Todorova & Durisin, 2007; Chengying et al., 2021). The form of FDI in generating innovation (Proposition 1) resembles the Brazilian scenario when it comes to absorbing knowledge and fostering practice to develop the offshore wind industry. Notwithstanding the fulfillment of Proposition 1, this category also seems to play an intermediation role in the way FDI can provide resources that allow it to be signaled more quickly between headquarters and subsidiaries, making it easier for organizations based in developing countries to absorb the knowledge necessary to develop in uncertain environments, aimed at supporting the creation of policies and accurate regulatory frameworks (Gupta et al., 2022; Yu et al., 2022).

5.2 Dynamic capabilities block

The DCs block had a repetition of n= 100, with a representation of 27.8% within the category matrix, highlighting the articulation of dynamic capabilities in the capture of resources aiming at the construction of an innovative capability that allows, through FDI, the consolidation of the offshore wind source in developing markets (Proposition 1 and 2). The block is the specific representation of the categorical analysis of Sensing, Seizing, and Reconfiguring.

The interviews and incidence analysis revealed that the Sensing category (n= 34) represented 9.47% of the total repetition. According to the interviewees, the implementation of offshore wind is already part of the knowledge applied by foreign companies and, based on the level of installations and infrastructure in the international market, is considered a technological innovation phenomenon. This context

offers Brazil a shortcut to access this type of technology, which positively impacts the invested capital of companies, which is an advantage for developing new businesses. This evidence can be associated with results presented by Teece (2007), Teece (2017), and Noronha et al. (2021a), validating Proposition 1. Furthermore, the literature indicates that the ability to *sense* opportunities by exploiting resources obtained via FDI can provide solutions that fill institutional gaps through innovations, driving pent-up demands from markets that have a lot of potential, but not yet regulated (Teece, 2007; Teece and Leih, 2016).

The Seizing category (n= 29), which is also relevant in the process needed to stimulate resources within a corporation, scored 8.08% of the representative total, which sheds light on the need for analysis regarding the investment that Brazil receives specifically in this sector. The purpose of investments in the national territory is to strengthen the competitiveness of companies in the sector, encourage the exchange of information between international markets, understand the flaws and opportunities of regulatory changes, and make comparisons that can help different organizations and institutions to design improvement plans. The interviewees' viewpoints regarding this context validate the perspectives of Ottoboni and Sugano (2009), Portman, Duff, Köppel, Reisert and Higgins (2009), and Borges and Machado (2019), and confirm Propositions 1 and 2. Additionally, it is worth mentioning that other scholars have emphasized that, from an organizational perspective, strategic planning is critical to leveraging FDI, leading firms to quickly articulate their strategic decisions according to their relation and dependence on regulatory modifications of developing markets (Borges & Machado, 2019).

Reconfiguring (n= 37) was the most representative category in our analysis process, reaching 10.31% of the representative total. Respondents point out that there is already an innovation program active in the Brazilian market, but there is still a lack of incentive for wind sector companies to contribute to it. Within this context, the focus is to improve the adoption of technological innovations in the offshore wind sector, which highlights the need for more direction and refinement regarding the origin of investments and public policies that support the sector. This need to outline more robust criteria to strengthen the innovation process is congruent with the findings of Teece (2007), Brink (2019), and Noronha et al. (2021a), regarding the orchestration process between dynamic capabilities and innovation capacity, evidencing the fulfillment of Proposition 2. In a complementary manner, the international literature indicates that adaptation to technological contexts should take into account existing organizational resources and knowledge to operate new technologies in developing markets, aiming to generate innovation from international knowledge brought by FDI injected into a country (Teece, 2007).

5.3. Innovation capacity block

The IC block (n= 80) represents 22.28% of our study's total categorical repetition, starting from the investigation of the main factors necessary to achieve innovation in the offshore wind industry through FDI and also to assess the reallocation of DCs in these companies (Proposition 1) and the emergence of new capabilities arising from external capital and innovation generation (Proposition 2). Three categories are listed in this block: People Management, Project Management, and Strategic Management of Technology.

The People Management for Innovation category (n= 22) represented 6.13% of the categorical repetition and is associated with the culture shock that happens in the international scenario and in the information exchange process, giving companies more autonomy in the creation of new knowledge (Amabile et al., 2004; Lopes et al., 2021). These phenomena are related to features that arise from international cultures, changing the dynamic capabilities among human resources in the company (Proposition 2). Furthermore, it is reinforced that the engagement of teams and institutions is fundamental for the dissemination of knowledge via existing resources (Amabile et al., 2004). Only that way is it possible for organizations to rely on international teams to boost their institutional environment, making regulatory learning transversal to the technological sector they belong to (Lopes et al., 2021).

The Project Management category (n= 31), with 8.64% of categorical repetition, is a result of the improvement generated and boosted by FDI, allowing the creation of pilot projects and strengthening the regulation in the national market. In this way, innovative projects, research, and development are fos-

tered by this specific flow of capital, paving the way for the construction, maintenance, and operation of offshore wind farms in the future (Cooper & Kleinschmidt, 2007; Ferreira, 2019). The planning of firms coordinated with their ability to manage novel projects determines how FDI will be administered and also how it consolidates the next steps of how they will operate their capabilities to establish themselves in developing markets (Azam & Haseeb, 2021). The ability to manage expectations by targeting the regulatory and market framework allows firms to pursue new opportunities through FDI so they can thrive in an environment of regulatory uncertainty (Rovere et al., 2020).

The Strategic Management of Technology category (n= 27) is the last one of the block, with 7.54% of categorical repetition, concluding the mission to reallocate resources and foster the creation of projects to regulate market rules and create new solutions (Valladares et al., 2014; Ferreira, 2019). In this way, the strategy raised by the company with the resources of external capital is what maintains the strategic positioning of the industry and can be used to change its dynamic capabilities and generate innovation and competitive advantage. Other scholars have observed that firms in an embryonic stage can rely on this context to network with institutions and regulatory agents and expose their interest in technology development in developing countries (Khan et al., 2020). However, this advantage varies from the normal scenario in developed countries because, in such cases, competitiveness is associated with technology disputes, pricing, and limitation regarding the expansion in market growth (Park & Tang, 2021).

5.4 Emerging category block

The Emerging Categories block covers the main findings that are not part of the present theoretical framework but were often identified during the analysis of the interviewees' viewpoints. This block represents 24.23% of the categorical repetitions of this research, with a total of n= 87 repetitions. The categories identified were: Diffusion of Technological Innovation, Institutional Gaps, and Triple Helix. It is noteworthy that the emerging categories unfold into research propositions that are presented further in Section 8.

The Diffusion of Technological Innovation category (n= 28) represented 7.80% of the categorical repetition of the study and is associated with the adoption of offshore technology and its relative advantage, considering the compatibility, complexity, testability, and observability of the technology in the research context (Rogers, 1983). Moreover, offshore wind energy is inserted as a new technology in the global energy matrices as a way to explore new resources for the generation of electric energy, based on its physical generation features. Furthermore, the adoption of offshore wind energy is seen by many nations as a way to diversify their energy matrix, facilitating their insertion in the context of technological, institutional, and regulatory innovation. When this process started, offshore wind began to compete in a large energy environment filled with non-renewable sources, decentralizing the energy matrix of a given interconnected system due to technological innovation. This technological innovation is a result of new knowledge and capabilities of organizations that help them fill the market and regulatory gaps related to the operationalization of this resource. Our reports (Figure 3) helped us visualize that this category demonstrates that FDI provides opportunities via technology transfer, operating DCs through the concepts of Sensing and Seizing, and promoting the adoption of technological innovations from the perspective of offshore wind energy. In this context, we also consider the existence of bottlenecks such as storage, hydrogen production, and energy transmission that can be potential solutions achieved with FDI associated with development and innovation (Proposition 2).

The Institutional Voids category is rooted in the fundamentals of Institutional Theories and represents the low governance and lack of a structured chain of intermediary agents corroborating the creation of market and regulatory environment gaps (Khanna & Palepu, 2000). This category represents the highest incidence of repetition in the block (9.75%) with a total of 35 repetitions. According to Brink (2019) and Noronha et al. (2021a), these gaps occur mainly in emerging markets, reflecting the need to create policies aimed at the demands of innovative markets that meet the discussions held among the agents involved in this context. In addition, this phenomenon drives the exploration of the innovation capacity of the industry to fill these voids

and make the market more functional. The categorical data of the representative matrix are aligned with the reports we previously presented in our research, demonstrating that FDI is a mechanism that can moderate the companies' ability to generate innovation through offshore technology. Innovation could help drive the structuring of regulatory frameworks based on the infrastructure and opportunities generated by technology related to lower environmental impacts and job creation, resulting in spillovers in multiple industries. Thus, in order to maintain the flow of capital tied to the technological market, the process of institutional innovation can indeed help filling these market and regulatory gaps (Proposition 1). This study's findings regarding this specific research category shed light on new research paths for structuring future propositions to categorically understand how technology diffusion through capabilities can boost the implementation of new energy technologies in energy markets.

Finally, the *Triple Helix* category (n= 24) represented 6.69% of the total number of repetitions and is associated with the innovation ecosystem, especially considering the role of academia, government, and institutions for the development of business innovations to foster the consolidation of the offshore wind industry in Brazil and other emerging markets (Brink, 2019; Noronha et al., 2021a). In this way, it is essential to find ways and strategies to attract the flow of external capital to boost organizational DCs to obtain innovation capacity that can positively impact the production chain and the technological growth of the emerging Brazilian market. The successful operation of offshore energy requires the creation of regulatory measures that represent legal security for agents involved in the industry. Furthermore, technological maturity and research development are important for the insertion of this energy source into the Brazilian context. This highlights the need for government support to regulate the use of offshore wind as an energy resource, and the support of academia to visualize new questions addressed to the integration and formulation of sectorial policies to expand the goals established to accelerate the consolidation of the industry. Information shared by our interviewees demonstrated that technological innovations drive the development of the regulatory framework, which is stimulated by discussions already sustained internationally. Thus, FDI from countries that already have experience with technology and regulation generates value for the sector to face existing challenges and may be used as a resource to prepare companies to fill regulatory gaps and solidify the productive chain, encouraging an innovation ecosystem among main stakeholders (Proposition 2 and 1).

FINAL CONSIDERATIONS

Our study presents a model that identifies how FDI drives the development of DCs to generate IC in the Brazilian offshore wind energy industry, aiming to answer the research question "*How can FDI drive the development of dynamic capabilities (DC) to generate the creation of Innovation Capacity (IC) in companies in the offshore wind industry?*". Our goal was met by presenting the paths of the scientific literature that solidified the structured qualitative propositions of the paper, allowing us to outline a model (Figure 4) that represents how firms can obtain innovation capacity from dynamic capabilities driven by FDI.

Propositions 1 and 2 were fully met based on the categories extracted from our data, which were in line with the literature explored throughout the study. Our model is applied to emerging markets that are under development in the technological and regulatory sense and how they can benefit from the knowledge obtained from other countries with technical and economic maturity in this realm. Thus, the findings presented are complementary to the existing literature, filling gaps related to FDI and developing markets. Our data showed that organizations with technological bases seeking to operationalize innovative energy sources and other new technologies might achieve technological innovation before the proper structuring of a regulatory environment (refer to our model presented below in Figure 4).

This model illustrates the articulation of the theoretical lenses in the categories, relying on the main results to demonstrate the flow of FDI to markets in developing countries, focusing on the changes of dynamic capabilities to generate innovation capacity, thus reinforcing the importance of our research question. The research results illustrated by the model encompass the industrial context regarding the insertion of new technologies that receive funds from foreign capital to leverage innovation capacity to de-

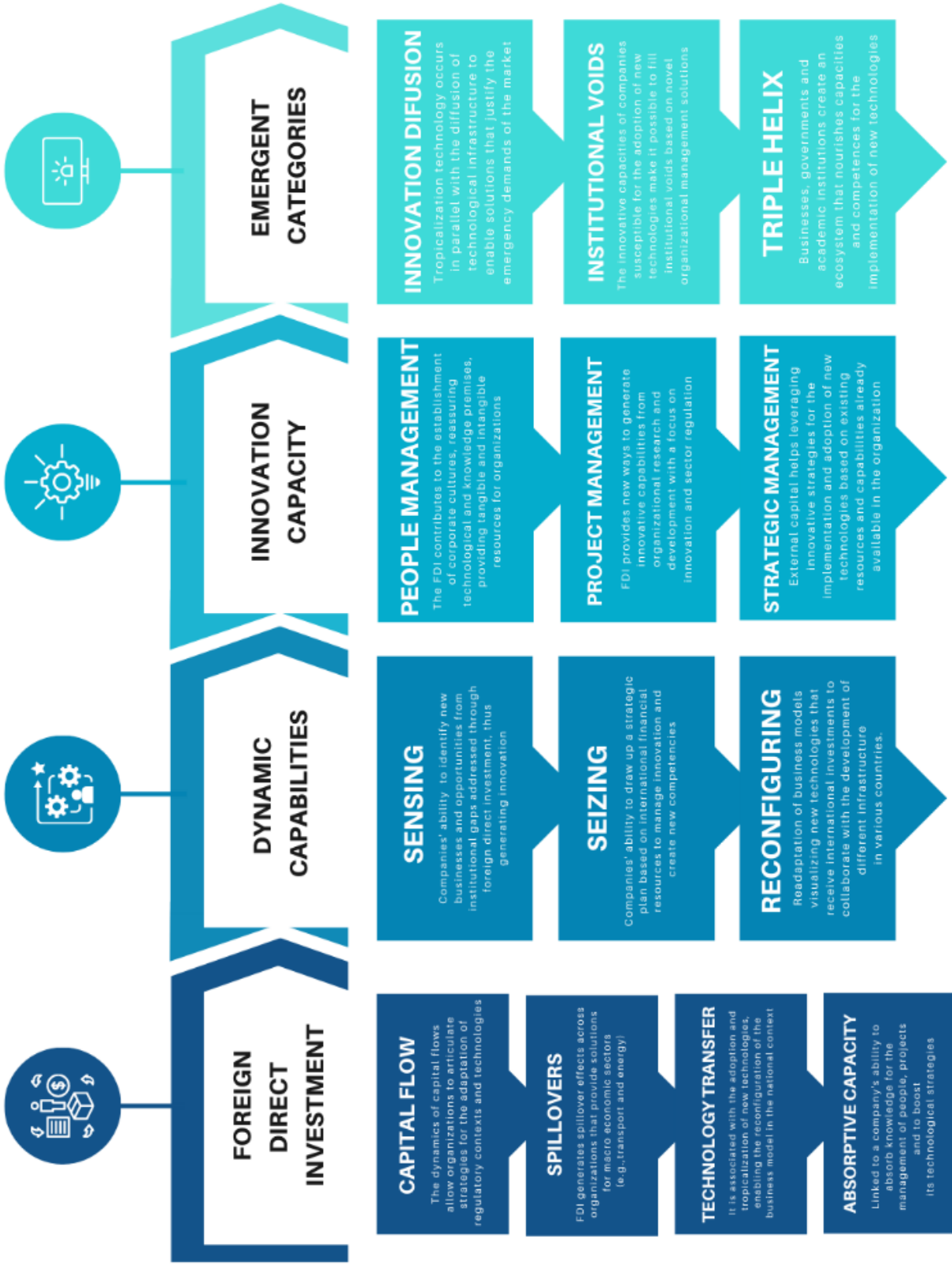


Figure 4. Final model.

velop within developing markets (*e.g.*, offshore wind in the Brazilian context).

It is worth mentioning that the present model varies from findings presented in the existing literature when it comes to observing how the unit of analysis can bring distinct outcomes to the fields of international business and innovation by exploring theoretical lenses of FDI, DCs, and IC (Smith et al., 2008; Teece, 2018; Ross, 2019). These findings demonstrated in the research provide a distinction between developed and developing markets that are structuring regulations to accommodate new technologies and international innovations captained by FDI. This movement covers research gaps related to the diffusion of technological innovation, filling institutional voids through entrepreneurial capabilities, but still demands the engagement of the government, academia, and organizations (Mahbub & Jongwanich, 2019; Noronha et al., 2021a). This conceptual amalgam obtained through the results of the theoretical articulation outlines new directions for future researchers to investigate how emerging categories can position themselves as part of technology cases in developing markets.

Moreover, the scientific contribution of our research is associated with the fact that FDI enables the development of DCs to orchestrate the resources of organizations to generate innovations that reflect on IC, stimulating the structuring of a regulatory framework and a solidified innovation ecosystem (Brink, 2019; Noronha et al., 2021a). The articulation of the theoretical lenses directs the advancement of FDI-related studies, as well as research focused on dynamic capabilities and innovation capacity, toward a competitive and innovative environment in the offshore wind energy sector, reinforcing the role of the capabilities of economic agents in structuring a framework for emerging markets that target wind energy and new complementary technologies.

The practical contributions of this work evidence that the FDI articulated by institutions to generate the adoption of technology in the institutional, organizational, and regulatory spheres helps fill institutional voids through an innovative and technological ecosystem, subsidizing the paths for organizations in the sector to keep developing and making room for tech novelties. Furthermore, our findings also pointed out that the main distinction between the context of emerging and developed countries that provide the basis for FDI to boost the capabilities to generate innovation lies in the regulatory gaps for the consolidation of technologies and the fact that they require the support of organizations that have already learned and are consolidated in developed countries. Only by looking into these organizations can one promote the exchange of knowledge that is brought through FDI to environments where innovation is achieved before regulatory and institutional structuring.

Future research agenda, propositions, and limitations

Based on the aforementioned findings, we suggest that researchers deepen the articulation of potential findings related to the Diffusion of Technological Innovation, Institutional Voids, and Triple Helix to strengthen the theoretical articulation about the offshore wind energy context in other emerging markets, fostering new paths for science and technological practice. Acknowledging some of this work's limitations, we also suggested that researchers deepen their understanding of the theoretical lenses that can be used to verify the association between the variables applied in this research, aiming to confirm and highlight the correlation and impact that the Brazilian offshore wind industry can bring to the economy and society from the perspective FDI, DCs, and IC. Furthermore, as an unfolding of the research context, we highlight the importance for new researchers to study environments in which innovation arrives before the structuring of regulatory and institutional frameworks and how the process of consolidation of new technology occurs, especially in developing economies. This deployment must be observed under theoretical lenses that cover not only a quantitative approach but also a qualitative one of exploratory nature to establish a procedural and discursive analysis seeking to understand the phenomenon from in-depth perspectives.

Additionally, aiming to cover the case studies based on the emerging categories that were contemplated as findings in our study, researchers should guide their new research design based on the data provided here, collaborating to strengthen the literature in the field and promote the dialogue within the academic community.

As an example, future researchers should investigate the diffusion of technological innovation

provided by organizational capabilities to accelerate the adoption of new technologies fostered by foreign direct investment in different emerging markets, observe how this process can help fill the institutional voids through organizational capabilities and technological innovations that precede the existence of regulatory frameworks in such countries. Another way to contribute to the literature is to verify the articulation between firms' ICs and FDI by questioning the engagement of the triple helix to consolidate new energy technologies in developing markets.

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O PAPEL DO INVESTIMENTO DIRETO ESTRANGEIRO PARA O DESENVOLVIMENTO DA CAPACIDADE INOVADORA NA INDÚSTRIA DE ENERGIA EÓLICA OFFSHORE BRASILEIRA

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DETALHES DO ARTIGO

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RESUMO

Objetivo: Propor um modelo que identifique como o investimento direto estrangeiro (IDE) impulsiona o desenvolvimento de capacidades dinâmicas (CD) para gerar capacidade de inovação (CI) na indústria brasileira de energia eólica offshore. **Método:** Pesquisa qualitativa do tipo estudo de caso, com amostragem de snow-ball baseada em 32 entrevistas semi-estruturadas de 26 empresas atuantes no setor de energia eólica offshore. A análise de conteúdo foi utilizada na análise dos dados coletados. Principais **Resultados:** A análise revelou que o IDE impulsiona CDs para gerar CI, apontando também novas categorias (achados), como: difusão de inovação tecnológica, vazios institucionais e tríplice hélice para o desenvolvimento de tecnologia inovadora na indústria de energia eólica offshore. **Relevância / Originalidade:** Articulação contextual entre IDE, CD e CI aplicada à conjuntura das empresas de energia eólica offshore e seu desenvolvimento no mercado. **Contribuições Teóricas / Metodológicas:** Apresentou-se um novo modelo de literatura articulado em IDE e CD, gerando CI, elucidando a originalidade de nossos achados através da apresentação de novas categorias para examinar a indústria eólica offshore, incluindo Difusão de Inovação Tecnológica, Vazios Institucionais, e Tríplice Hélice . **Contribuições Sociais / para a Gestão:** IDE articulado pelas instituições para gerar a adoção de uma tecnologia no âmbito institucional, organizacional e regulatório visando preencher vazios institucionais por meio de um ecossistema inovador e tecnológico.

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