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The Mediating Effect of ESG between Organizational Ambidexterity and Organizational Performance in Sanitation Companies in Brazil

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1 Introduction

At times, organizations seek to recreate and/or improve products, processes, and resources with the purpose of innovating their businesses, making them both sustainable and profitable. In such circumstances, various factors come into play, such as intense competitive pressures, a globalized economy, climate and technological changes, as well as numerous ideas that compel companies to innovate (Agostini et al., 2016; Yang et al., 2022).

Due to the numerous organizational strategic changes, March (1991) introduced the concepts of disruptive innovation capability (exploration) and incremental innovation (exploitation), highlighting the notion of Organizational Ambidexterity (OA). In the literature, several studies indicate that when these activities are well-developed and balanced, they can enhance Organizational Performance (OP) (Gieske et al., 2020; Katou et al., 2021; Sarmento et al., 2024; Úbeda-García et al., 2020). However, some research has pointed to a negative effect in the relationship between OA and OP (Ebben & Johnson, 2005), or has not confirmed that OA necessarily has a positive and significant impact on OP (Alamayreh et al., 2021; Sirén et al., 2012).

Organizational performance (OP) can be measured through quantifiable financial parameters as well as non-financial indicators, such as customer satisfaction and loyalty, and the support of local communities connected to an organization's social initiatives (Alamayreh et al., 2021; Ferreira Neto & Forte, 2023). In this context, environmental, social, and corporate governance aspects have taken on a prominent role, reaching a level of importance equivalent to financial information in the global market (Sadiq et al., 2023). The ESG (Environmental, Social, and Governance) agenda gained greater relevance in 2015, driven by the United Nations' 2030 Agenda and the Paris Agreement, both aimed at the Sustainable Development Goals (SDGs). In 2020, this focus was further reinforced with the launch of the European Green Deal (Koundouri & Plataniotis, 2022).

Researchers have identified in their studies that ESG practices have a positive effect on organizational performance (Aybars et al., 2019; Liu et al., 2022; Velte, 2017), and other studies have found a positive relationship between OA and ESG (Alkaraan et al., 2023; Luan & Wang, 2023; Xie et al., 2019).

Within this dialectic, we find studies exploring various relationships among the three constructs—organizational ambidexterity (OA), ESG (Environmental, Social, and Governance), and organizational performance (OP): ESG acting as a mediating variable with innovation as the independent variable, rather than specifically focusing on innovation capability (which may be characterized as OA) (Luan & Wang, 2023); and studies that examine some ESG pillars (environmental, social, or governance) as mediators in the relationship between innovation and OP (Jansen et al., 2006; Xie et al., 2019).

It is therefore evident that the literature has already discussed relationships using some ESG pillars—environmental, social, or governance—as mediators in the relationship between innovation and OP. However, there remain gaps in studies that consider the integrated ESG construct as a mediator in the relationship between OA and OP, as well as a lack of research addressing these constructs within the basic sanitation sector and in the Brazilian context. Thus, the present investigation aims to address these gaps by focusing not on innovation itself, but on innovation capability (organizational ambidexterity), mediated by a latent ESG variable in its effect on OP, since the ability to innovate to drive performance must consider environmental, social, and governance factors.

The Brazilian basic sanitation sector, the empirical focus of this research, plays a fundamental role in society, particularly regarding social and environmental issues, and is a

topic of global concern (Zaccariotto, 2022). In Brazil, in 2020, the Federal Government established the New Legal Framework for Basic Sanitation, introducing new guidelines aimed at the universalization of water and sewage services (Brasil, 2020). As more sanitation companies adopt sustainable technologies and innovative solutions aligned with ESG principles, the sector's contribution to sustainability increases. This approach fosters the development of cleaner and more sustainable environments, helps mitigate persistent socio-environmental challenges in Brazil, and simultaneously promotes the preservation of natural resources, environmental protection, and improvements in public health. Moreover, the adoption of ESG practices provides valuable input for the development of action plans and effective public policies aimed at the universalization of water and sewage services, in line with the guidelines of the New Legal Framework for Basic Sanitation.

In companies, it is crucial for decision-makers, policymakers, stakeholders, investors, and corporate managers to understand the impacts of ESG on financial metrics. However, it is important to note that these effects may vary depending on company size (Minutolo et al., 2019). Therefore, company size is a relevant variable, and in this study, we investigate—through multigroup analysis—potential differences between medium-sized and large companies in the Brazilian basic sanitation sector within the proposed model. Company size was used as a control variable, moderating the relationships between the constructs of OA and OP, OA and ESG, and ESG and OP.

Given the need to understand and compare the roles and models of ESG in interplay with OA and OP, considering the importance of the topic and the necessity to deepen the relationships among OA, ESG, and OP—with ESG acting as a mediator to better explain the causal relationships between OA and OP or as the mechanism through which these effects occur—this research question arises: *What is the mediating effect of ESG in the relationship between organizational ambidexterity and organizational performance in Brazilian basic sanitation companies*? This study aims to investigate the mediating effect of ESG in the interaction between Organizational Ambidexterity and Organizational Performance in Brazilian basic sanitation companies.

For the methodological implementation of this study, the research is classified as quantitative, exploratory, descriptive, and explanatory, conducted through structural equation modeling and multigroup analysis, with a sample of 100 companies from the sanitation sector in Brazil.

The study presents theoretical relevance by establishing and analyzing a conceptual model that integrates the constructs of OA, ESG, and OP, fostering a discussion on the importance of ESG as a mediator in the relationship between OA and OP. Furthermore, it reinforces the idea that ESG practices exert positive influences on OP and mediate the relationship between OA and OP. The study also holds empirical relevance, given that the locus of investigation is the Brazilian basic sanitation sector—a topic of great global importance (Zaccariotto, 2022). Additionally, this sector plays a significant socio-environmental role for society, and its contributions to other aspects of sustainable development have been increasingly recognized in recent years (Dickin et al., 2020; Huang & Zhou, 2021).

As for contextual relevance, the research considers that the basic sanitation sector is undergoing a phase of meeting universalization targets established by the New Legal Framework for Basic Sanitation in Brazil, which introduces new guidelines for the universalization of water and sewage services (Brasil, 2020). The study also has practical and managerial relevance, with potential applications in the organizational field by managers and leaders of sanitation companies. It examines the effects within the proposed model, as well as identifies and strengthens innovation strategies to achieve desirable performance. Additionally, it encourages the adoption of ESG practices, considering that these exert positive influences on OP, especially in the context of large companies within the Brazilian basic sanitation sector.

In the academic sphere, professors and researchers are prepared to utilize the proposed theoretical model in their teaching and research lines to help develop new models. The study also highlights public policy and social relevance, considering that basic sanitation companies play a fundamental role in public health and the well-being of people and the environment—especially given that it is conducted in Brazil, a country facing substantial challenges related to basic sanitation, with alarming deficit data in this sector that predominantly affect the most vulnerable segments of society (SNIS, 2021).

2 Theoretical Framework

The exploration of new capabilities (exploration) and the refinement of existing capabilities (exploitation) within organizations form the basis of organizational ambidexterity (OA) (O'Reilly III & Tushman, 2013; Úbeda-García, 2020). Ambidextrous companies increase their sales and improve their performance, since exploration and exploitation activities, when aligned and balanced, leverage resources and innovation processes (Severgnini et al., 2018; Vrontis et al., 2016).

OP is one of the most relevant dependent variables that attracts researchers' interest across various management fields, since through performance organizations can achieve growth and expansion (Forte et al., 2022). In the academic literature, there is a body of research indicating that OA is positively associated with OP: Gieske et al. (2020) conducted a study among teams from 22 regional water authorities in the Netherlands, obtaining 667 responses; Katou et al. (2021) studied a sample of 657 Greek employees working in 99 private organizations; Sarmento et al. (2024) carried out research targeting 324 top managers and senior executives from Portuguese companies operating in a B2B context; Úbeda-García et al. (2020) conducted an online survey with general and human resource managers from 120 Spanish hotels. Thus, we propose the following hypothesis:

H1+: *Organizational Ambidexterity positively influences Organizational Performance*.

An ambidextrous organization requires the integration, mobilization, and coordination of organizational resources to ensure both exploration and exploitation, with decision-making that adopts assertive sustainable practices (Alkaraan et al., 2023). There is a close relationship between a company's innovation capability and environmental management and green practices (Pérez-Valls et al., 2015). Green innovation exerts a positive influence on companies by fostering technologies that enable cleaner production and sustainable practices, impacting both the environment and society (Zhang et al., 2020).

The concept of ESG reflects companies' efforts to reduce their environmental impacts and adopt practices that make them sustainable, socially responsible, and well governed (Sadiq et al., 2023). Xie et al. (2019) highlight that innovation in green processes includes initiatives such as reducing atmospheric emissions and effluents, replacing fossil fuels with bioenergy, decreasing water consumption, and increasing energy and resource efficiency. Regarding innovation, Luan and Wang (2023) found in Chinese companies that open innovation has a positive effect on firms' environmental, social, and governance performance. With a more focused approach, Zhang et al. (2020) argue that green innovation accelerates the company's green transformation and creates the need for sustainable practices.

The incorporation of sustainable management practices in organizations can generate a range of benefits. The implementation of ESG actions across different sectors of the company contributes to reducing risks associated with controversial information and inconsistent decisions, while also providing more accurate and relevant data for decision-making (Liu et al., 2022; Zhang et al., 2020). Furthermore, sustainability-oriented corporate management tends to be well received by customers and the local community, promoting stable, socially responsible administration with greater market valuation (Liu et al., 2022; Zhao et al., 2018). This, in turn, can attract investors and other stakeholders by offering a clearer view of the benefits of investing in companies with established ESG practices.

Studies have revealed favorable results regarding the vital role that organizational ambidexterity (OA) plays in Industry 4.0 technologies and circular economy practices (including renewable energy and cleaner production processes—environmental and social factors for sustainable societies), and that internal and external governance mechanisms strengthen the relationship between these technologies (Alkaraan et al., 2023). Thus, we propose the following hypothesis:

H2+: *Organizational Ambidexterity positively impacts ESG*

Research indicates that companies that incorporates environmental or social concerns into their practices are likely to achieve favorable financial outcomes (Aybars et al., 2019; Hahn et al., 2015; Liang et al., 2022). ESG practices have recently been recognized as a management strategy essential for business survival, with a significant impact on organizational performance (Chouaibi et al., 2022; Liang et al., 2022).

Liu et al. (2022) identified that companies with environmental practices are able to reduce inefficiency costs and strengthen their market position, which fosters new business opportunities and improves their performance. Velte (2017) validated the positive relationship between ESG and OP in a study involving 412 German companies. Additional research also indicates that ESG practices have a positive influence on OP (Chouaibi et al., 2022; Friede et al., 2015; Huang, 2021). Thus, we propose the following hypothesis:

H3+: *ESG positively impacts Organizational Performance*.

Many companies are adopting innovative and sustainable strategies in pursuit of improved OP, with particular emphasis on ESG strategies. Examples of such sustainable practices include Netflix, which introduced a social practice by emphasizing corporate culture; Microsoft, which implemented environmental practices focused on reducing carbon emissions; and SK, which adopted a governance practice by increasing the independence of its Board of Directors (Liang et al., 2022).

Chouaibi et al. (2022) point out that companies with strong ESG performance contribute to raising awareness about green and low-carbon production. Xie et al. (2019) highlight the growing concern for the state of the environment, emphasizing that companies have a responsibility to protect it through sustainable and socially responsible practices and processes, taking into account the demands of both customers and society. The authors show that green process innovation (i.e., more efficient and less polluting production processes) mediates the relationship between green product innovation (products designed to minimize negative impacts on the environment and human health) and a company's financial performance. It is evident that by referring to green practices and processes, the authors are addressing the environmental, social, and governance pillars.

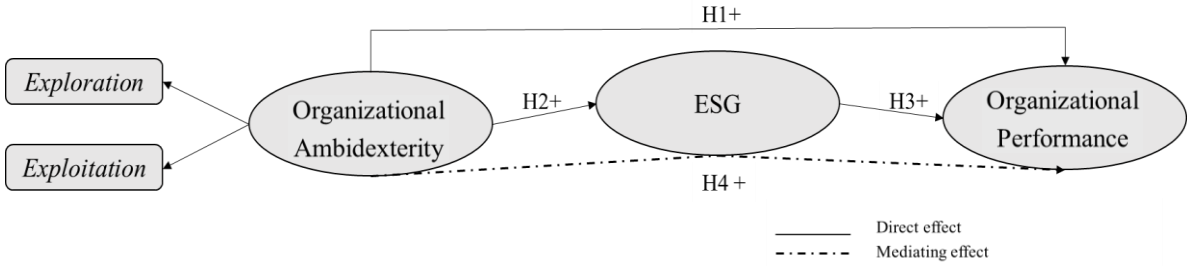
Jansen et al. (2006), in a study conducted at a large European financial services company, found that environmental aspects (one of the ESG pillars) play a positive mediating role between innovation and financial performance, especially when environmental dynamism is high. Another example of mediation is provided by Luan and Wang (2023), who, in a study of Chinese companies, found that ESG acts as a mediator between open innovation and firm value. ESG also functions as a risk control mechanism, influencing decision-making and enabling improved OP.

Therefore, based on the cited literature and supported by the direct effects proposed in H1+, H2+, and H3+, it is reasonable to suggest that ESG practices explain the process through which innovation capability influences OP. Thus, we propose the following hypothesis:

H4+: *ESG mediates the relationship between Organizational Ambidexterity and Organizational Performance*.

Based on the formulated hypotheses, the conceptual model (framework) of this research is presented in Figure 1:

Figure 1 – Conceptual Model



Source: Developed by the authors (2023)

In this research, we aim to identify theoretical findings that demonstrate how ESG relates to AO and OP.

3 Research Methodology

3.1 Research Typology

This study represents a quantitative research based on data collection, grounded in the development and testing of a conceptual model (Kothari, 2008). The study also follows a descriptive approach, outlining a profile of the situation and the organizations involved, providing researchers with essential indicators regarding the phenomenon under investigation (Sileyew, 2019). Additionally, the study includes an explanatory phase of the investigated data, justifying the factors that clarify the motivation behind the phenomenon studied by social researchers (Sainani, 2014).

3.2 Data Collection

We consulted scientific articles from the databases *EbscoHost*, *Web of Science*, *Scielo, Scopus*, and *Google Scholar* published between 2015 and 2023. The abstracts of the texts served as the primary source of analysis, except for *Google Scholar,* where the search was based on titles. The search was conducted using the descriptors *Organizational Ambidexterity*, *ESG*, and *Performance*, applied in a bidirectional (pairwise) manner among them.

The research was directed to the top executives of sanitation sector organizations located across the five regions of Brazil. The target population of this study comprises 631 companies in this sector. Emails were sent to all of them between November 7, 2023, and March 10, 2024, containing a link to access the questionnaire via *Google Forms*. Additionally, contact was made via telephone and *WhatsApp*. It is important to note that, from the total of 1,871 sanitation companies in Brazil (SNIS, 2021), we excluded 1,236 companies belonging to direct public administration and four social organizations due to their small-sized, which would make it difficult to establish comparisons with data from large-sized organizations.

To develop the data collection instrument, we structured a self-administered questionnaire, which is low-cost, allows for broader geographic coverage, and is often perceived as more anonymous (Cooper & Schindler, 2016). The questionnaire included demographic data and three scales related to the constructs: OA, ESG, and OP. To measure the OA construct, we used the scale applied by Sharma et al. (2020). To assess the ESG construct, we employed the scale developed by Liang et al. (2022), while for the OP construct, we adopted the same scale used in the study by Prieto & Pilar (2012) (see Appendix A).

These measurement instruments were evaluated using a seven-point *Likert* scale, ranging from one (strongly disagree) to seven (strongly agree) (Malhotra, 2011), based on the respondents' company data from the past three years (2021 to 2023). The scale items were translated following the *translation* and *back-translation* procedures (Guillemin et al., 1993).

The sample reflects non-probabilistic characteristics, meaning there was no control over who completed the questionnaires. To mitigate common method bias, we adopted procedures to ensure respondent anonymity and informed participants that there were no right or wrong answers (Podsakoff et al., 2003).

The minimum number of research participants was determined using the G*Power* software*,* version 3.1.9.7*,* which indicated a required sample size of 68 companies. According to Hair Jr. et al. (2014), the sample size should typically be two to three times larger than the value calculated by *GPower*. We obtained 108 valid questionnaires: 8 from small-sized companies, 54 from large-sized, and 46 from medium-sized companies. To avoid potential bias in the analyses, the small-sized companies were excluded, resulting in a final sample of 100 valid questionnaires, distributed as follows: 39 autonomous government agencies, 27 private companies, 27 mixed-capital companies with public administration (SEMAP), and 7 public companies. The number of questionnaires obtained did not reach the upper limit suggested by Hair Jr. et al. (2014), which represents a limitation of this study.

We conducted face validation of the questionnaire with ten respondents and a pilot test using the first 30 completed questionnaires. Reliability testing was performed using *Cronbach's Alpha* to assess the instrument's consistency. The OA, ESG, and OP scales demonstrated satisfactory reliability (Malhotra, 2011), with values exceeding the minimum required threshold of 0.70 (Hair et al., 2017), allowing the research to proceed.

Examining the potential for late response bias, we compared early responses (first half) and late responses (second half) using an independent samples t-test and found no statistically significant differences between the groups (Roldán Bravo et al., 2018). Given that each company had only one respondent, attention to common method variance was warranted. We conducted methodological tests, including Harman's Single-Factor Test, which is widely recognized in the literature (Podsakoff et al., 2003). Discriminant validity was assessed using the HTMT criterion (Henseler et al., 2015), as shown in Table 3.

3.3 Data Analysis

The data collected in the study were recorded in a Microsoft Excel® spreadsheet (Microsoft 365 MSO version 2307) and later exported to IBM® SPSS® Statistics software, version 29.0.0.0. Outliers were excluded from the sample, and a descriptive analysis of the final data was conducted. We calculated OA using the formula presented by Hughes et al. (2021), as shown in Formula (1).

$$\text{Ambidexterity} = \sum\left((\text{Explore x Exploit}) - \sqrt{(\text{Explore} - \text{Exploit})^2}\right) \quad (1)$$

Subsequently, the processed research data were transferred to the SmartPLS SEM (*Smart Partial Least Squares - Structural Equation Modeling*) software, version 4.0.9.6. Finally, we conducted a multigroup analysis to assess whether there were differences in the model paths between large and medium-sized companies (Cahyaningratri & Naylah, 2023).

4 Results

4.1 Descriptive Analysis

The study includes 46 medium-sized companies and 54 large-sized companies: 38 autarchies, 27 private companies, 27 mixed-economy companies with public administration (SEMAP), and seven public companies. A total of 76 companies operate at the regional level, 19 at the local level, and five at the micro-regional level. There are 43 companies that have been operating for over 40 years; 40 for 20 to 40 years; and 15 for 10 to 20 years, while two units have been in operation for less than 10 years.

The sample comprises 30 companies from the Northeast region, 20 from the North, 20 from the Southeast, 16 from the South, and 14 from the Central-West. This study included representatives from 90% of SEMAP companies, which account for 76.28% of the total direct operating revenue within the universe of 1,871 basic sanitation organizations in Brazil (Instituto Trata Brasil, 2023).

Table 1 shows the values of the arithmetic mean, standard deviation, and coefficient of variation.

Table 1 - *Univariate Descriptive Statistics*

Constructs	Mean		SD		CV		Minimum		Maximum	
	MC	LC	MC	LC	MC	LC	MC	LC	MC	LC
OA	5.28	5.32	1.24	1.17	23.5%	22.0%	1	7	1	7
ESG	5.14	5.50	1.16	1.08	22.5%	19.5%	2	7	1	7
OP	5.45	5.67	0.96	1.08	17.7%	20.2%	1	7	1	7

Nota: SD = Standard Deviation; CV = Coefficient of variation; MC = Medium-sized Companies; and LC = Large-sized Companies.
Source: Research data (2024).

Both OA, ESG, and OP showed mean values above five. The three constructs exhibited small differences between the averages of large-sized and medium-sized companies, with higher values observed in large-sized companies.

As for the standard deviation, the values are close to 1, indicating low variability in the responses. Accordingly, the coefficient of variation showed values below 30%, demonstrating a certain degree of data homogeneity (Fávero & Belfiore, 2020).

4.2 Structural Equation Modeling

The evaluation and interpretation of the SEM model were conducted in two phases: measurement analysis and structural analysis (Hair Jr. et al., 2014). We analyzed both the reliability and validity of the model. First, we used Composite Reliability (CR) to assess the internal consistency of the construct variables. Although Cronbach's Alpha (CA) has traditionally been used, CR is considered a more appropriate measure (Hair Jr. et al., 2014).

In the proposed model, to assess convergent validity, we used both CA and CR, which showed values above 0.7 (Purwanto & Sudargini, 2021).

Table 2 presents the results of discriminant and convergent validity.

Table 2 - Reliability and validity

Construct	Item	Factorial Load	CA	CR	AVE	VIF
Organizational Ambidexterity			0.898	0.925	0.711	
	AMB01	0.813				2.368
	AMB02	0.880				2.925
	AMB03	0.850				2.397
	AMB04	0.787				1.975
	AMB05	0.880				2.897
ESG			0.860	0.890	0.570	
	ESG01	0.764				1.914
	ESG03	0.634				1.466
	ESG04	0.677				2.075
	ESG05	0.724				2.298
	ESG06	0.718				1.635
	ESG07	0.672				2.034
	ESG08	0.657				1.895
	ESG09	0.822				2.186
Organizational Performance			0.852	0.888	0.570	
	ORP01	0.729				1.880
	ORP02	0.727				1.988
	ORP03	0.693				1.787
	ORP04	0.799				2.372
	ORP05	0.786				2.706
	ORP06	0.789				2.729

Source: Research Data (2024).

Discriminant validity was assessed using the HTMT criterion (Table 3). All results were clearly below the conservative threshold of 0.85 (*Rigdon et al., 2017*), thus confirming discriminant validity. The indicator ESG02 (Manages its environmental performance through

evaluation and auditing systems) was excluded due to a factorial load below 0.600, which negatively influenced the AVE (*Hair et al., 2017*).

Table 3- *HTMT - Heterotrait-Monotrait ratio*

Constructs	OA	OP	ESG
OA			
OP	0.659		
ESG	0.804	0.716	

Source: Research Data (2024).

According to Table 4, the values found indicate that the results for the constructs OA and OP show high predictive relevance, with $Q^2 > 0$ (Geisser, 1975).

Table 4 – *Predictive Validity*

Construct	R^2	adjusted R^2	Q^2
ESG	0.521	0.517	0.505
Organizational Performance	0.462	0.462	0.330

Source: Research Data (2024).

The adjusted R^2 (see Table 4) for the relationship between OA and ESG was 0.517, and the model is explained with an R^2 of 0.462, which are considered substantial according to Cohen (1998), who proposes the following scale: R^2 values of 0.02, 0.13, and 0.26 are considered weak, moderate, and substantial, respectively. Hypotheses H1+, H2+, H3+, and H4+ were supported, as shown in Table 5 (Hair et al., 2017; Henseler et al., 2016).

Table 5 – *Results of the hypothesis*

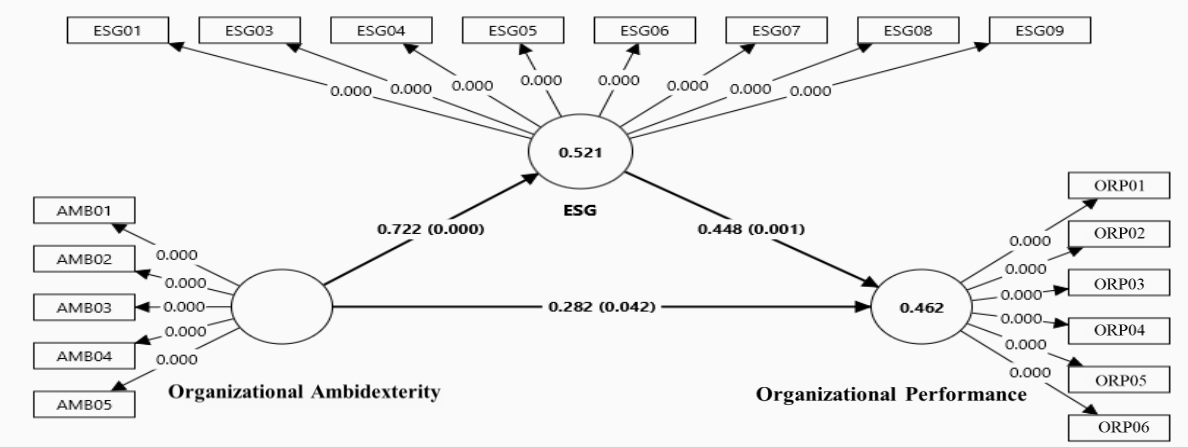
Relation	Hypothesis	Path Coefficient	Standard Deviation	f^2	Value of p	Decision
OA → OP	H1+	0.282	0.139	0.071	0.042	Suppported
OA → ESG	H2+	0.722	0.049	1.088	0.000	Suppported
ESG → OP	H3+	0.448	0.458	0.179	0.001	Suppported
OA → ESG → OP	H4+	0.323	0.102		0.002	Suppported

Source: Research Data (2024).

The results show that the indirect effect OA → ESG → OP (0.323) is greater than the direct effect OA → OP (0.282). Cohen's f^2 (1998) is used to calculate the effect size for each path model. The mediation indicated $\beta = 0.323$, $p < 0.05$, while the direct relationship between OA and OP showed $\beta = 0.282$, $p < 0.05$. The $\beta = 0.323$ is derived from the multiplication of 0.722*0.448.

Figure 2 presents a structural model diagram generated by *SmartPLS,* using *bootstrapping* with 5,000 subsamples, one-tailed testing, a significance level of 0.05, and a path weighting scheme.

Figure 2 – *Mediation of ESG in the relationship between OA and OP*



Source: Extracted from SmartPLS (2024)

The mediation of ESG in the relationship between OA and OP was calculated, with its mediation effect estimated using the variance accounted for (VAF) method suggested by Hair Jr. et al. (2014). The VAF value (VAF = indirect effect / total effect) was 0.53 (53%). This value falls within the range of 20% to 80%, indicating ESG as a partial mediator (Hair Jr. et al., 2014). This result suggests that ESG partially mediates the relationship between OA and OP.

4.3 Multigroup Analysis (MGA) – Invariance – Size

The analysis begins with the creation of two groups from the research data: medium-sized and large companies. Here, we used the MICOM procedure. The first step of the MICOM procedure involved examining configural invariance. All measurement indicators were included in the constructs for both groups, indicating that configural invariance was confirmed. In step 2, compositional invariance was analyzed (Table 6).

Table 6 - *Results Report of Step 2*

Construct	Original Correlation	Mean of the permuted correlation	5.00%	Permutation Value of p
OA	0.999	0.998	0.995	0.428
OP	0.999	0.998	0.994	0.784
ESG	0.990	0.994	0.987	0.122

Note: Research data (2024).

The next step in the process was to test measurement invariance.

Table 7 - *Results Report of Step 3 – Part 1*

Construct	Original Difference	Permutation of the differences of the means	2.5%	97.5%	Permutation Value of p
OA	-0.254	0.002	-0.388	0.402	0.220
OP	-0.378	-0.004	-0.409	0.398	0.062
ESG	-0.594	-0.001	-0.402	0.398	0.004

Source: Research data (2024).

The first part of Step 3 (Table 7) indicated partial invariance for ESG, meaning the difference does not fall within the 95% confidence interval. This construct did not meet the criteria required at this stage to establish full invariance. Therefore, only partial invariance is confirmed for this construct, while for OA and OP, invariance was confirmed (p>0.05) (Matthews, 2017).

Table 8 – *Results report of step 3 – part 2*

Construct	Original Variance Difference	Permutation of the variance differences	2.5%	97.5%	Permutation Value of p
OA	0.150	-0.009	-0.598	0.597	0.601
OP	-0.066	-0.004	-0.732	0.689	0.851
ESG	0.104	-0.012	-0.503	0.470	0.677

Source: Research Data (2024).

Regarding Step 3 of the MICOM procedure, Table 8 shows full invariance (Matthews, 2017) for the constructs OA and OP, and partial invariance for the construct ESG.

Table 9 – *Path coefficients – Bootstrapping results*

Correlation	Medium-Sized Companies Coefficients	Small-Sized Companies Coefficients	Mean Difference	2.5%	97.5%	Permutation Values of p	R^2 Medium-Sized	R^2 Large-Sized
OA → ESG	0.464	0.110	0.354	-0.529	-0.006	0.000	0.489	0.599
ESG →OP	0.663	0.736	-0.073	-0.225	0.221	0.000	0.434	0.536
OA → OP	0.307	0.694	-0.387	-0.509	0.524	0.472		

Source: Research Data (2024).

Once measurement invariance (whether partial or full) was established, multigroup analysis (MGA) was employed to examine differences between groups by comparing medium and large-sized companies (Matthews, 2017).

Table 10 – *Path coefficients – Bootstrapping results*

Correlation	Medium-Sized Companies Coefficients	Large-Sized Companies Coefficients	Mean Difference	2.5%	97.5%	Permutation Values of p	R^2 Medium-Sized	R^2 Large-Sized
OA→ ESG	0.464	0.110	0.354	-0.529	-0.006	0.000	0.489	0.599
ESG →OP	0.663	0.736	-0.073	-0.225	0.221	0.000	0.434	0.536
OA → OP	0.307	0.694	-0.387	-0.509	0.524	0.472		

Source: Research Data (2024).

The results obtained through multigroup analysis show that the relationship between OA and ESG presents a coefficient approximately four times higher for medium-sized companies, suggesting the importance of innovation capability within the ESG concept for medium-sized companies in shaping OP.

For large companies, the relationship between ESG and OP proved to be more robust (with a higher coefficient), suggesting that companies of this size are better positioned to generate performance through ESG initiatives, as indicated by a higher coefficient of determination (R^2). These findings are consistent with those of Minutolo et al. (2019), who found that the influence of ESG conduct on OP is greater in larger companies compared to smaller ones.

Company size influences the relationships between OA and ESG, and between ESG and OP. However, in the relationship between OA and OP, the result was not significant ($p > 0.05$), as shown in Table 10.

5 Discussion, Theoretical and Empirical Contributions

Table 5 shows the results of the path coefficients, verifying whether the hypotheses proposed were supported by the study. In this study, we identified that ESG practices have positive impacts on OP; that OA has a positive impact on ESG; and that ESG partially mediates the relationship between OA and OP.

The first hypothesis (H1+), which suggested that OA positively influences OP, was supported: (H1+: $\beta = 0.282$; $p = 0.042$). The evidence shows that the greater the OA, the better the OP is expected to be, consistent with the results of Gieske et al. (2020), Katou et al. (2021), Sarmento et al. (2024), Severgnini et al. (2018), Úbeda-García et al. (2020), and Vrontis et al. (2016), who found that OA is positively associated with OP.

The relevance of OA for improving OP is well recognized in the literature; however, studies on how ESG influences organizational outcomes as a mediator are still in their early stages. The findings of this research indicate that OA, resulting from the combination of exploration and exploitation operational activities, contributes to superior business performance.

The second hypothesis (H2+), which suggested a positive relationship between OA and ESG, was supported. H2+: $\beta = 0.722$; $p = 0.000$. These results are consistent with the findings of Luan & Wang (2023), Zhang et al. (2020), and Xie et al. (2019), who highlight innovation as an important factor in accelerating the green transformation of companies, positively influencing environmental, social, and governance practices in the corporate environment.

The results show that basic sanitation companies, by leveraging their innovation capabilities, have a positive influence on ESG practices, which are commonly incorporated as essential strategies in their operations—such as the creation of a Sustainability Committee, a Decarbonization Plan, Socio-environmental Projects, and the establishment of an ESG management division (SNIS, 2021).

The third hypothesis (H3+), which assumed that ESG positively influences OP, was supported: H3+: $\beta = 0.448$; $p = 0.001$. These results are in line with the findings of Aybars et al. (2019), Chouaibi et al. (2022), Friede et al. (2015), Hahn et al. (2015), Huang (2021), Liang et al. (2022), Liu et al. (2022), and Velte (2017). These studies indicated that ESG practices have a positive impact on organizational performance (OP). Many companies require OP to be assessed in light of ESG principles, demonstrating strong concern for actions and processes focused on environmental, social, and governance aspects (Edmans, 2023).

Sanitation companies implement various social, environmental, and governance strategies to optimize their processes and improve their outcomes. The universalization of basic sanitation certainly contributes to reducing disease rates, significantly lowering hospitalization costs related to gastrointestinal infections in the Brazilian Unified Health System (SUS) (SNIS, 2021). These conditions generate savings, boost the country's performance, and benefit sanitation companies, which tend to receive increased government investment as an incentive—for example, through public policies that promote ESG practices.

The findings of this research contribute to the literature by discussing the triangulation of OA in OP, with the ESG construct considered in an integrated manner rather than in isolation by dimension, acting as a partial mediator—but also as a driver of impact on performance. This is evidenced by the fact that the indirect effect OA → ESG → OP (0.323) is greater than the direct effect OA → OP (0.282), involving these constructs within the basic sanitation sector and in the Brazilian context.

The fourth hypothesis (H4+), which states that ESG mediates the relationship between OA and OP, was supported: H4+: $\beta = 0.323$, $p = 0.002$. Our findings are consistent with the studies of Jansen et al. (2006) and Xie et al. (2019), who identified the pillars of ESG (environmental, social, or governance) as mediators in the relationship between innovation and performance. We also align with the work of Luan and Wang (2023), in which ESG acts as a mediator between innovation and firm value, positioning ESG as a risk control mechanism that influences decision-making, thus enabling better OP. Therefore, it is accurate to state that environmental, social, and governance practices explain the process through which innovation capability influences the companies OP in the basic sanitation sector.

In the analysis of the descriptive statistics, the three constructs—OA, ESG, and OP—showed mean values above five, indicating that companies in the sector perform well in terms of OA (maintaining a high-level balance of exploration and exploitation), as well as ESG and OP. This highlights the relevance of ESG practices in the organizational environment of the basic sanitation sector in Brazil, acting as a partial mediator in this relationship, in which OA can be complemented by ESG practices to achieve favorable OP. This allows managers of these companies to assess the impacts of the model on their operations and identify the most effective actions to maintain the desired performance.

In the multigroup analysis, as shown in Table 10, the results revealed a relationship between OA and ESG with differences between groups in the basic sanitation sector in Brazil, being stronger in medium-sized companies than in large ones, although the coefficient of determination (R^2) was higher in large organizations. The relationship between ESG and OP was found to be significant and had a greater positive impact in large companies than in medium-sized ones, with a higher R^2 also observed in the group of large-sized companies. The relationship between OA and OP was not significant ($p > 0.05$).

The findings of this research are well-suited to assist companies—especially those in the basic sanitation sector—as well as federal and state governments in developing more effective ESG strategies aimed at enhancing OP and providing investors and stakeholders with a clearer understanding of the potential advantages of investing in companies with strong ESG practices. This study highlights the importance of ESG practices in fostering innovation and improving performance among leaders and organizations. It should encourage more companies to invest in innovative technologies aligned with ESG principles, fostering resilience, competitiveness,

and business sustainability. Moreover, it may motivate investors and stakeholders to better recognize the potential benefits of investing in companies committed to robust ESG initiatives. The study also supports public policy efforts by encouraging policymakers to analyze the impacts of different management models within the sanitation sector, contributing to the formulation of effective action plans and policies aimed at expanding access to water and sewage services, in alignment with Brazil's New Legal Framework for Basic Sanitation.

In the organizational field, this study is well-positioned to be used by managers of basic sanitation companies to analyze the effects of different models and identify strategies to achieve desirable performance. In the social field, this research encourages sanitation companies to adopt a more sustainable approach, acting environmentally as part of their mission—especially considering their crucial role in public health, people's well-being, and environmental protection. Therefore, the adoption of ESG practices is capable of contributing to a cleaner and more sustainable world. The study's limitations include the use of a self-report questionnaire, which increases the risk of social desirability bias, as well as the inability to replicate the same research with an identical sample at different times, in addition to the constraints related to the scope of the instrument used in the investigation.

6 Conclusion

This study empirically tested the influence of ESG (Environmental, Social, and Governance) as a mediating factor in the relationship between Organizational Ambidexterity (OA) and Organizational Performance (OP). The research was conducted in public and private basic sanitation companies across Brazil's five regions. The results showed that OA positively influences ESG (Environmental, Social, and Governance); ESG (Environmental, Social, and Governance) positively influences Organizational Performance (OP); and Organizational Ambidexterity (OA) also positively influences Organizational Performance (OP), highlighting the importance of these constructs in shaping organizational outcomes. It was also found that ESG (Environmental, Social, and Governance) practices, within the organizational environment of the basic sanitation sector, act as a partial mediator in the relationship between Organizational Ambidexterity (OA) and Organizational Performance (OP). This enables company managers to assess the impacts of the model on their operations, understand the importance of ESG (Environmental, Social, and Governance) practices for both the company and the world, and identify the most effective actions to maintain the desired performance, while also contributing to the creation of cleaner and more sustainable environments.

With regard to the multigroup analysis, the results indicated that company size within the Brazilian sanitation sector affects the outcomes. In the relationship between Organizational Ambidexterity (OA) and ESG (Environmental, Social, and Governance), company size acts as a moderator, with a coefficient approximately four times greater for medium-sized companies. In the relationship between ESG (Environmental, Social, and Governance) and Organizational Performance (OP), the effect was stronger (with a higher coefficient) for large-sized companies. The relationship between Organizational Ambidexterity (OA) and Organizational Performance (OP) was not statistically significant.

For future investigations, it is recommended to apply the study to a more representative sample of the sanitation sector in Brazil, allowing for the verification of possible moderating effects of the model variables through multigroup analysis. Although this research provides important contributions to the existing literature, it is essential to acknowledge its limitations, which also present opportunities for further studies.

One limitation of this study is the lack of similar research in the Brazilian context addressing specific constructs in sanitation companies. Regarding future research directions, there are several ways to expand this study. Examining the distinct contributions of ESG (Environmental, Social, and Governance) activities to exploration and exploitation innovation appears to be a promising research objective. Similarly, the use of innovation-related constructs

may prove valuable, potentially offering important insights to better position ESG (Environmental, Social, and Governance) within the innovation structure of organizations. Additionally, the moderation of institutional variables—such as government influence, culture, and societal ethics—could provide further depth to the analysis.

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APPENDIX A – SURVEY SCALES

1. Organizational Ambidexterity (Sharma et al., 2020)

Variable	Question	Variable	Question
	This government unit…		This government unit…
EXR01	Bases its success on its ability to explore new technologies	EXT01	Commits to improving quality and lowering costs
EXR02	Creates products or services that are innovative to this unit	EXT02	Continuously improves the reliability of its services
EXR03	Seeks creative ways to satisfy citizen's needs	EXT03	Increases level of automation in its operations
EXR04	Constantly tries to address needs of new customers	EXT04	Constantly surveys citizen's satisfaction
EXR05	Aggressively ventures into finding novel solutions	EXT05	Fine tunes what it offers to keep citizens satisfied

2. Organizational Performance (Pietro & Pilar, 2012)

Variable	Question	Variable	Question
	The company...		The company...
DO1	The company has improved its sales growth.	DO4	The company has improved its level of investments.
DO2	The company has improved its profi tability growth.	DO5	The company has improved its customer satisfaction.
DO3	The company has improved its market share.	DO6	The company has improved its employee satisfaction

3. Environmental, Social And Governance Construct – ESG (Liang et al., 2022)

Variable	Question	Variable	Question
	Strategy ESG		Strategy ESG
ESG1	Your firm is establishing environmental management strategies and action plans.	ESG6	Your firm actively participates in mutual life with its partners (or competitors).
ESG2	Your firm manages its environmental performance through evaluation and audit systems	ESG7	Your firm is building a process to guarantee shareholders' rights.
ESG3	Your firm actively supports the environmental protection activities of stakeholders.	ESG8	Your firm has established independent audit organizations inside and outside and monitors them at all times.
ESG4	Your firm actively participates in consumer protection.	ESG9	Your firm listens to opinions from stakeholders and markets and reflects them in management.
ESG5	Your firm actively participates in improving the working environment.		