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EXTERNAL COLLABORATION OF OPEN INNOVATION AND FINANCIAL PERFORMANCE OF SMES IN TAMAULIPAS, MEXICO

Colaboración externa de la innovación abierta y desempeño financiero de las PYMES en Tamaulipas, México

Colaboração externa da inovação aberta e desempenho financeiro das PMEs no Tamaulipas, México

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ABSTRACT

Open innovation is a collaborative paradigm that improves business performance. However, the majority of investigations approach large and multinational companies with developed economies, so this work analyzed the relationship of external collaboration of open innovation with financial performance in small and medium-sized companies in an emerging economy. For this, a questionnaire was applied to owners and managers of 145 companies located in Tamaulipas, Mexico. The results processed through structural equations in SPSS and AMOS indicate the absence of a positive and significant relationship between the vertical collaboration of open innovation (customers, users and suppliers) and financial performance. In contrast, a positive and significant relationship was found between the horizontal collaboration of open innovation (educational institutions, government and competitors) with financial performance, with elements such as co-development of products, inputs of knowledge and ideas, acquisition of machinery, equipment, software and supplies.

Keywords: Open innovation, horizontal collaboration, vertical collaboration, financial performance, emerging economy.

RESUMEN

La innovación abierta es un paradigma colaborativo que mejora el desempeño empresarial. Sin embargo, la mayoría de las investigaciones abordan empresas grandes y multinacionales de economías desarrolladas, por lo que este trabajo analizó la relación de la colaboración externa de la innovación abierta con el desempeño financiero en pequeñas y medianas empresas en una economía emergente. Para ello, se aplicó un cuestionario a propietarios y directivos de 145 empresas localizadas en Tamaulipas, México. Los resultados procesados mediante ecuaciones estructurales en SPSS y AMOS indican ausencia de relación positiva y significativa entre la colaboración vertical de la innovación abierta (clientes, usuarios y proveedores) con el desempeño financiero. En contraste, se comprobó una relación positiva y significativa entre la colaboración horizontal de la innovación abierta (instituciones de educación, gobierno y competidores) con el desempeño financiero, con elementos como el codesarrollo de productos, entradas de conocimiento e ideas, adquisición de maquinaria, equipo, software e insumos.

Palabras Clave: *Innovación abierta, colaboración horizontal, colaboración vertical, desempeño financiero, economía emergente.*

RESUMO

A inovação aberta é um paradigma colaborativo que melhora o desempenho dos negócios. No entanto, a maioria das investigações aborda empresas grandes e multinacionais com economias desenvolvidas. Este trabalho analisou a relação da colaboração externa da inovação aberta com o desempenho financeiro em pequenas e médias empresas em uma economia emergente. Para isso, foi aplicado um questionário a proprietários e gerentes de 145 empresas localizadas em Tamaulipas, no México. Os resultados processados por meio de equações estruturais no SPSS e AMOS indicam a ausência de uma relação positiva e significativa entre a colaboração vertical da inovação aberta (clientes, usuários e fornecedores) e o desempenho financeiro. Em contraste, uma relação positiva e significativa foi encontrada entre a colaboração horizontal da inovação aberta (instituições educacionais, governo e concorrentes) com o desempenho financeiro, com elementos como o codesenvolvimento de produtos, insumos de conhecimento e ideias, aquisição de máquinas, equipamentos, softwares e suprimentos.

Palavras-Chave: *Inovação aberta, colaboração horizontal, colaboração vertical, desempenho financeiro, economia emergente.*

INTRODUCTION

Currently, traditional or closed innovation is insufficient, however, open innovation arises as an alternative for research and development (R&D) to obtain knowledge and resources that improve financial performance through external collaboration, thus obtaining competitive advantages (Alvarez-Aros & Álvarez-Herrera, 2018; Chesbrough, 2003; Chesbrough, Vanhaverbeke, & West, 2006; Enkel, Gassmann, & Chesbrough, 2009; García-Vidales, Maldonado-Guzmán, & Pinzón-Castro, 2019).

This shows an open innovation complementary to internal R&D, characterized by experience and work capacity. On the other hand, open innovation collaborates externally, outside the organizational limits, obtaining ideas and knowledge to enrich innovative processes and financial performance (Chesbrough, 2006; Greco, Grimaldi, & Cricelli, 2015; Schroll & Mild, 2011).

However, although open innovation is more accepted in academia, the business world continues to explore the collaborative approach, as it has not made a strong contribution to the financial performance of any kind of companies and sectors (Chesbrough, 2003, 2015; Dahlander & Gann, 2010).

Most of the studies on open innovation focus on large and multinational companies in the technology and software sector. Consequently, the study in small and medium-sized enterprises (SMEs) and other sectors have not amply demonstrated the benefits generated (Calderón, 2010; Krause & Schuttle, 2015; Raposo, Ferreira, & Fernandes, 2014; Stanisławski, 2020; Yoon, Shin, & Lee, 2016).

As an example, Colombian and Venezuelan SMEs highlight the importance of external collaboration but carry out a traditionalist innovation with minor openings to suppliers and customers. In other words, companies work on internal, instead of collaborating externally and looking for other sources of knowledge and resources (Bernal-Torres & Frost-González, 2015; Rodríguez, Terán, & Bucci, 2011).

In an emerging economy like Mexico, innovation and its practices represent a key element for business performance and sustainability (Armenteros, Elizondo, Medina, Ballesteros, & Molina, 2012; Maldonado-Guzmán, Madrid-Guijarro, Martínez-Serna, & Aguilera-Enríquez, 2009; Souza, Torres, & Miyake, 2018). However, as far as open innovation is concerned, there is little research that supports external collaborations with organizational performance.

In business size, SMEs contribute mostly to the local economy and job creation, having more small economic units where they face greater challenges than multinationals (Andersen, 1999; Armenteros et al., 2012; Fred, 2017; Marín-Idárraga & Cuartas-Marín, 2019; Sánchez, Zerón & Mendoza, 2015; Ugarte-Cataldo, 2013; Vieira, 2014).

In Mexico, the National Institute of Statistics and Geography (Inegi) in 2016, registered 4.2 million economic units, 99.8% were SMEs and generated 52% of the gross domestic product (GDP) and 78% of the employment rate (Inegi, 2016). According to annual data from 1989, 1994, 1999, 2004, 2009 and 2014, the average survival of new businesses in Mexico is 7.8 years, but in Tamaulipas it is 6.4 years, ranking among the last states.

Tamaulipas contributes 3% of GDP, according to the National Statistical Directory of Economic Units (Denue) and is a relevant region due to its geographical location with respect to the United States of America (Denue, & Inegi, 2019). In this way, it highlights the importance of SMEs in the economy and jobs, and their survival and performance should be improved.

Therefore, the purpose of this research was to analyze the relationship of external collaboration of open innovation with the financial performance of SMEs in the northern border of Mexico, providing novelty and originality. To do this, methodologically, a questionnaire and structural equation modeling (SEM) was applied with SPSS and AMOS software. This research presents the theoretical foundation, the method, the results, and the conclusions.

EXTERNAL COLLABORATION AND FINANCIAL PERFORMANCE

External collaboration

From open innovation, external collaborations represent a strategy to complement R&D activities, and facilitate technological exploration, the generation of ideas and knowledge, and the acquisition of resources that improve organizational performance (Faems, Visser, Andries, & Looy, 2010; Greco et al., 2015; Mazzola, Bruccoleri, & Perrone, 2012; Rogo, Cricelli, & Grimaldi, 2014; Sisodiya, Johnson, & Grégoire, 2013).

The collaboration is dimensioned in vertical and horizontal external collaborations, in order to obtain ideas, knowledge, technology and opportunities (Parida, Westerberg, & Frishammar, 2012; Vrande, Jong, Vanhaverbeke, & Rochemont, 2009; Wang, Chang, & Shen, 2015). Collaboration with users, customers and suppliers is called vertical external collaboration (Bueno & Balestrin, 2012; Chatenier, Verstegen, Biemans, Mulder, & Omta, 2010; Chesbrough et al., 2006; Gassmann, Sandmeier, & Wecht, 2006; Henkel, 2006). Collaboration with educational institutions, government and competitors is called horizontal external collaboration (Cancino & Cárdenas, 2018; Lee, Park, Yoon, & Park, 2010).

Vertical external collaborations cooperate with exogenous agents, such as users, clients and suppliers, and take advantage of resources such as knowledge. In this way, it influences the company to the extent that it can connect with external agents in the innovation process, and exchange experiences and solutions, through knowledge transfer (Gassmann et al., 2006; Hippel, 2005; Schweisfurth & Raasch, 2015).

In addition, users reduce costs in generating innovative ideas, mutually benefiting. Companies encourage users to co-develop products through strategies such as open-source, where technology is made available to the public to collaborate without guarantees (Bueno & Balestrin, 2012; Henkel, 2006; Hienerth, 2006).

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On the other hand, resources are accessed through interaction with customers that provide more detailed external knowledge of business needs, such as innovation processes where several business areas intervene that efficiently capture ideas to meet customer needs and create new or improved products and services (Hippel, 2005; Khanagha, Volberda, & Oshri, 2016; Schweisfurth & Raasch, 2015).

Within the vertical external collaborations are the suppliers, who provide great benefits in the innovation processes, either due to a lack of external inputs that companies do not have in their learning processes, or also working on joint solutions of matters premiums, delivery times, guarantees (Chatenier et al., 2010; Romijn & Albaladejo, 2002).

On the other hand, in horizontal external collaborations, innovation efforts are made jointly to create and maintain superior performance, in addition, external knowledge is acquired that provides a diversity of ideas and technological capabilities (Cancino & Cárdenas, 2018; Hagedoorn, Roijakkers, & Kranenburg, 2006; Lee et al., 2010; Tether, 2003).

In horizontal external collaborations, academic research has been fundamental to accelerate the results of innovation and business performance (George, Zahra, & Wood, 2002; Vrande et al., 2009). Companies acquire knowledge from universities, taking into account the technological life cycle, to make decisions regarding the number of people involved, the resources assigned, the positioning within or outside the limits of the company, the degree of specialization and the degree of formalization among others (Buganza & Verganti, 2009).

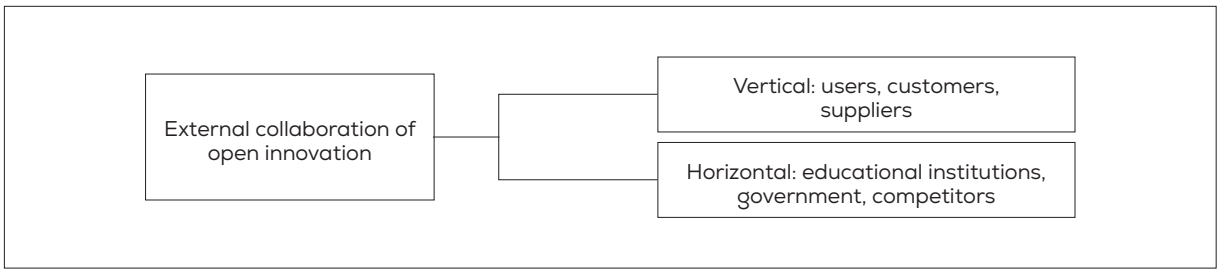
The horizontal external collaborations with the government promote policies, economic support, business advice to improve products and services, new markets, joint ventures, associations, alliances and R&D consortia to manage organizational knowledge, without ruling out informal networks to create and manage knowledge (Feller, Finnegan, Hayes, & O'Reilly, 2009; Lee, Hwang, & Choi, 2012; Pipkin, 2018).

Horizontal external collaboration with competitors is increasingly used because technologies, customers and markets are shared, not only technology and knowledge are acquired, but other global knowledge sources are accessed where the purpose is the integral development of technologies, the creation of new markets, the discovery of new business opportunities, increased profits in the search for innovation and better organizational performance (Lee et al., 2010; Parida et al., 2012).

Therefore, collaborative companies develop specific characteristics that increase their efficiency through the acquisition of technology and complementary knowledge, addition, collaboration strategies increase the use of human capital and resources, so it is necessary to set limits that prevent the scarcity of resources and meeting contracted needs and their interactions (Alvarez-Aros & Bernal-Torres, 2017; Mention & Asikainen, 2012; Quintana-García & Benavides-Velasco, 2004).

In summary, collaborations with horizontal and vertical external agents represent new advantages and opportunities in areas such as open innovation, representing an invitation to organizational openness outside of business boundaries, as shown in Figure 1:

Figure 1. External collaboration of open innovation



Source: Prepared from Parida et al. (2012); Vrande et al. (2009); Wang et al. (2015).

From Figure 1, it can be seen that collaboration is classified according to whether it is supported by each external agent, however, it depends on the strategy of each organization to determine which collaborations improve innovation and financial performance, an issue addressed in the next section.

Financial performance

Good performance is sustained by financial viability, effectiveness, efficiency, and organizational productivity. In this regard, the measurement of organizational performance has undergone changes over time, however, the financial perspective remains in force on issues such as open innovation (Fry, Mention, Temel, & Torkkeli, 2016; Hung & Chou, 2013). As an example, Mazzola, Bruccoleri and Perrone (2016) studied biopharmaceutical companies and their mix in open innovation practices to extend R&D processes beyond business boundaries and improve financial results.

Other examples of the benefit of external collaborations are P&G, IBM, Intel, Safer, Philips, Unilever and Whirpool, where economic achievements are highlighted, acquisition, application and protection of ideas, new scientific and technological knowledge, the interaction of the channels of network communication with external agents and organizational flexibility to face adversities (Chesbrough, 2015; Muller & Hutchins, 2012; Ollila & Yström, 2015).

In this sense, greater business flexibility with the ability to respond and adapt to the environment provides greater financial returns, both to the company and to its collaborators in open innovation, as argued by empirical studies that highlight the effect of spillovers from the network of knowledge, as they are key resources that improve relational capacity with external connections (Ollila & Yström, 2015; Sisodiya et al., 2013).

Therefore, despite the fact that organizational performance has been measured differently in its evolution, the financial dimension was chosen for the study because it represents a great interest for SMEs and open innovation (Akhisar, Tunay, & Tunay, 2015; Laursen & Salter, 2006). In this regard, the indicators that measure financial performance are based on return on investment (ROI), return on assets (ROA), growth in sales, profits, earnings per share, market value and book value (Akhisar et al., 2015; Kalkan, Bozkurt, & Arman, 2014; Sánchez et al., 2015).

External collaboration and financial performance

Financial performance and its relationship with external collaborations suggests that a company improves its results through interaction with vertical and horizontal external agents (Hung & Chiang, 2010; Laursen & Salter, 2006; Mazzola et al., 2016). In this way, vertical external collaboration with clients and suppliers is beneficial for company innovation due to the combination of complementary technological capabilities and common objectives with external agents (Hwang & Lee, 2010; Tsai, 2009).

In addition, horizontal external collaboration with research centers and universities positively impacts the innovative performance of products (Hung & Chiang, 2010; Tsai, 2009); since these agents have mechanisms to access new knowledge. On the other hand, other investigations confirmed that the external acquisition of knowledge has a negative effect on organizational results and innovation (Inauen & Schenker-Wicki, 2011).

Also, the opening to universities in R&D processes has a positive impact on the percentage of sales of innovative products, therefore, it represents a positive effect on financial performance (Inauen & Schenker-Wicki, 2011). However, researchers such as Belderbos, Faems, Leten and Looy (2010) suggest the possibility of a negative effect of these practices on financial performance, if the organizational limits are not maintained.

In fact, although collaborative R&D activities could reduce technical risks and costs associated with uncertainty, external collaboration could introduce relational risks and increase coordination costs (Das & Teng, 1998). To mitigate such risks, companies require contractual negotiations that could be time-consuming to design and implement, as well as to formulate generally costly monitoring mechanisms.

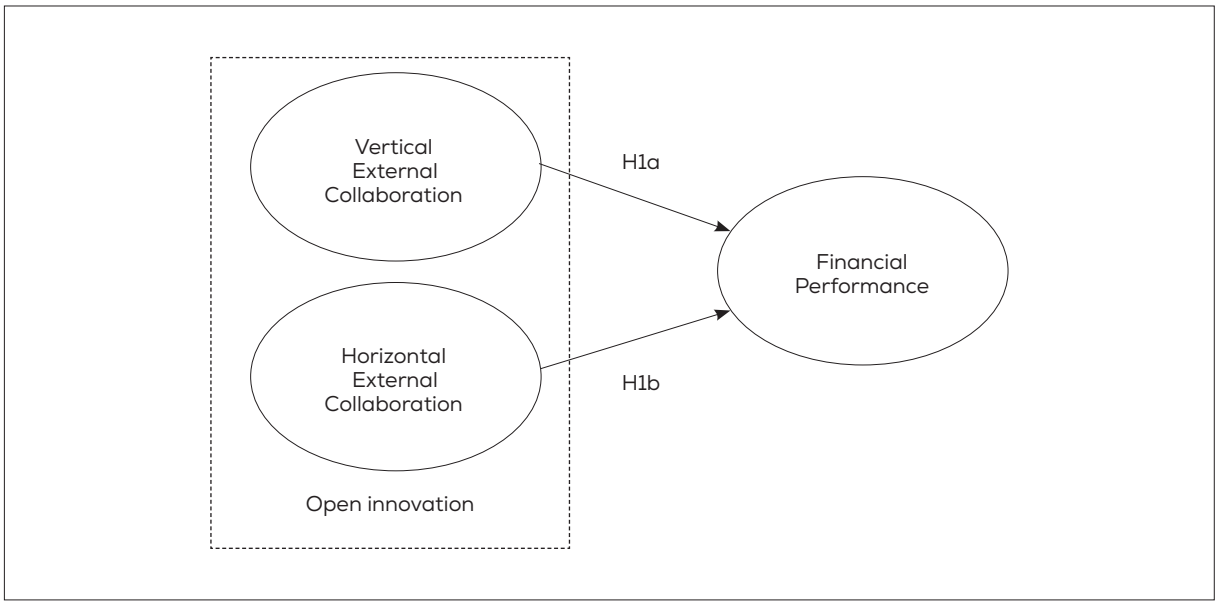
From the above, there are multifaceted reasons for this negative relationship, including inadequate or insufficient absorption capacity (Cohen & Levinthal, 1990; Martínez-Senra, Quintás, & Caballero, 2014) to absorb knowledge and technologies from other industries, or the fading of resources that the acquisition of external knowledge creates. In addition to impacting innovative performance (Aschhoff & Schmidt, 2008), some empirical works described show that collaboration with external agents tends to be beneficial, not only in innovation, but also in financial performance. Therefore, as a result of the schism of the previous considerations, the following hypotheses are raised:

H1a: The vertical external collaboration of open innovation positively and significantly influences the financial performance of SMEs.

H1b: The horizontal external collaboration of open innovation positively and significantly influences the financial performance of SMEs.

The hypotheses and the representation of the model are seen in Figure 2.

Figure 2. Conceptual model and hypothesis



METHODOLOGICAL DESIGN

Method

In order to verify the hypotheses raised, an investigation with a quantitative approach, of causal scope, cross-sectional, was designed through the collection of data with primary sources by means of a questionnaire. Before applying the definitive questionnaire, a pilot test was carried out with 30 companies from Tamaulipas to identify possible interpretation problems, guarantee the correct use of the scale and achieve the validity of the instrument. The data collection was through a 5-point Likert scale survey, consisting of 14 items related to the measurement of both vertical and horizontal external collaboration and seven items to measure financial performance

The questionnaire was made up of two sections. The first compiled general information, such as position, education, gender, business sector and business size. The second collected data on external collaboration and financial performance.

In vertical external collaboration, 7 items related to business involvement were used to research, develop or innovate with: current clients; potential customers; current users; potential users; current providers; potential suppliers; and if the involvement is carried out through a web service or digital platforms to facilitate collaborations with users, clients, and suppliers. The design was based on Afcha (2011), Obea (2009), y Vrande et al. (2009).

In horizontal external collaboration, the 7 items used were related to business involvement with: educational institutions; government; competitors; joint work of activities such as the

co-development of products or services with educational institutions, or government or competitors; use of networks for the exchange of experiences with educational institutions, or the government or competitors; obtaining inputs of knowledge and ideas with educational institutions, or government or competitors; entries of equipment, machinery, software, and supplies with educational institutions, or government or competitors. The items were based on Afcha (2011), Obea (2009), Vrande et al. (2009) y Wang et al. (2015).

For the items of vertical and horizontal external collaboration, the scale options were: one "never", two "rarely", three "sometimes", four "most of the time" and five "always".

To evaluate financial performance, the items used were related to profitability; collection from clients; payment to suppliers; inventory turnover; return on assets; return on sales; and return on investment. For these items, were taken into account the works of Martínez, Charterina and Araujo (2010), Park and Lee (2011), Rogo et al. (2014) and Sisodiya et al. (2013). The options on the scale were: one "lousy", two "bad", three "fair", four "good" and five "superior".

The questionnaire was applied to a non-probabilistic sample for convenience (without statistical inference) and was sent by email to 250 executives, that is, owners, general and financial managers of SMEs in the industrial, commercial and services sector in Tamaulipas, Mexico. Prior to shipment, chambers and associations provided the contacts were contacted and provided the e-mails. 170 surveys were received, but 25 were discarded due to multivariate normality problems, according to the Mahalanobis test (McLachlan, 1999), leaving a final sample of 145 questionnaires.

Data processing

Statistical processing was performed with SPSS 24 and AMOS, with the multivariate structural equation modeling technique (SEM), because it analyzes multiple relationships between variables. This technique involves estimating the measurement and structural model. The first verifies the suitability of the items used to evaluate each construct (vertical and horizontal external collaboration and its relationship with financial performance). The second verifies the relationships between the latent variables created (Weston & Gore, 2006), that is, vertical and horizontal external collaboration.

Subjects

The subjects analyzed were 145 owners and managers of SMEs (small 75% and medium 25%) of the industrial (23.45%), commercial (48.28%) and services (28.27%) sectors, in Tamaulipas, on the northern border of Mexico. The data collected was from complete questionnaires, sent digitally to 250 companies in mid-2019, selected under the criteria of having five years or more of economic activity.

This is because there is consensus that the evaluation of innovation requires a period of business activity. The characteristics of the owners and managers were: 73% men and 27% women; 48% owners and 52% managers; Regarding academic training, 1% said they had no training; 8%, upper secondary level; 77%, undergraduate and 14%, specialty or postgraduate.

RESULTS AND DISCUSSION

Measurement model

Confirmatory factor analysis was used to check the reliability and validity of the scales. First, the standardized factor loadings (SFL) were analyzed for each item of the vertical (VEC), horizontal (HEC) and financial performance (FP) external collaboration constructs, eliminating those with loads below the minimum acceptable value of 0.700. (Hair, Black, Babin, & Anderson, 2014).

Three items were eliminated from the vertical external collaboration construct (Vec3, Vec4, Vec7), of horizontal external collaboration, three items were excluded (Hec9, Hec12 y Hec14), and four items were eliminated from financial performance (FP1, FP2, FP3 y FP4. Next, the reliability of the measurement scales was assessed through Cronbach's alpha (α) and the composite reliability index (CRI), which obtained values higher than the required minimum of 0.700 (Nunnally, 1978). Subsequently, the convergent validity was reviewed, which shows an adequate correlation between items that make up a construct, measured with the average variance extracted (AVE), with values above the acceptable threshold of 0.50 (Fornell & Larcker, 1981).

In summary, there are three results to be highlighted in Table 1. First, financial performance is determined by the return on assets, the return on sales and the return on investment, the most relevant aspects considered in financial activity. (Akhisar et al., 2015; Kalkan et al., 2014; Sánchez et al., 2015).

Second, vertical external collaboration is done with current and potential suppliers and customers, which is consistent with other empirical results. (Bueno & Balestrin, 2012; Chatenier et al., 2010; Chesbrough et al., 2006), although without highlighting the current and potential users of the products or services.

Third, horizontal external collaboration manifests itself through interaction with educational institutions, government, and competitors. (Cancino & Cárdenas, 2018; Lee et al., 2010), in the co-development of products or services, obtaining knowledge and ideas from the environment, the acquisition of equipment, machinery, software and supplies, and the use of networks for the exchange of experiences with educational institutions, government and competitors, in accordance with other studies (Feller et al., 2009; Lee et al., 2012).

(Continua)

Table 1. Validation of the measurement scales

Variable	Indicator	SFL	α	CRI	AVE
Financial performance	FP5. Return on assets	0.842	0.895	0.896	0.743
	FP6. Return on sales	0.880			
	FP7. Return on investment	0.863			
Vertical external collaboration	Vec1. Potential customers	0.913	0.861	0.869	0.626
	Vec2. Current customers	0.666			
	Vec5. Current providers	0.818			
	Vec6. Potential Suppliers	0.748			
Horizontal external collaboration	Hec8. Co-development of products or services with educational, government or rival institutions	0.683	0.800	0.804	0.509
	Hec10. Obtaining knowledge and ideas with educational institutions, government or rivals	0.697			
	Hec11. Acquisition of equipment, machinery, software and supplies with educational institutions, government or rivals	0.834			
	Hec13. Networks for the exchange of experiences with academic institutions, government and competitors	0.624			

Source: Own elaboration based on the results results from AMOS.

Regarding the discriminant validity, it allows demonstrating the difference of one construct from the rest in the model, and it was analyzed by comparing the AVE and the squared correlations of each construct, the AVE being higher than the recommended correlations (Fornell & Larcker, 1981), observed in Table 2.

Table 2. Discriminant validity

Constructs	Financial performance	Vertical external collaboration	Horizontal external collaboration
Financial performance	0.743		
Vertical external collaboration	0.052	0.626	
Horizontal external collaboration	0.166	0.271	0.509

Source: Results from AMOS.

Structural model

Table 3 lists the indicators of goodness of fit appropriate to Hair et al., (2014), obtaining a reliable incremental adjustment of CFI=0.964, TLI=0.951, NFI= 0.918, greater than 0.900 recommended. On the other hand, a good absolute fit was achieved, with an RMSEA = 0.070,

lower than the recommended 0.0800. (Browne & Cudeck, 1992). Finally, the parsimony adjustment determined by chi-square / gl was adequate with a value of 1,700, being a value less than 2,000.

Table 3. Model fit

Statistical	Value	Abbreviation	Criterion
Absolute adjustment			
Chi squared	69.713 (0.003)	X2	Significance >0,050
The root of the mean square residual of approx.	0.070	RMSEA	< 0,080
Incremental adjustment			
Comparative goodness-of-fit index	0.964	CFI	> 0,900
Index of Tucker-Lewis	0.951	TLI	> 0,900
Normalized fit index	0.918	NFI	> 0,900
Parsimony			
Chi-square / gl ratio	1.700	(CMIN/DF)	Smaller than 3.000

Source: Results from AMOS.

The data in Table 4 show that vertical external collaboration has a low positive and non-significant effect on the financial performance of SMEs (H1a), with a P value of 0.831 (the hypotheses are accepted with P values <0.05), Therefore, the claim that vertical external collaboration of open innovation positively and significantly influences the financial performance of SMEs is rejected, being a different finding from previous research (Hippel, 2005; Khanagha et al., 2016; Schweisfurth & Raasch, 2015).

From the previous finding, this could be due to the fact that the collaboration relationship with clients and suppliers is limited to informal dialogues on basic activities (types of products or services, specifications, prices, volumes, etc.), and not to formal and complex activities that involve changes in products or services, inputs, supply chains, etc. The foregoing shows that this type of collaboration is not always relevant for companies, or that it requires an appropriate configuration, human resources, and qualified external agents, as other empirical studies assert (Huang, Krull, & Ziedonis, 2020; Raposo, Ferreira, & Fernandes, 2014).

While horizontal external collaboration has a positive and very significant effect on financial performance, with a P value of 0.001 (H1b). Therefore, the hypothesis that the horizontal external collaboration of open innovation positively and significantly influences the financial performance of SMEs is confirmed. The above is consistent with work done by Afcha (2011), Cancino and Cárdenas (2018) and Wang et al. (2015), in which it is stated that getting involved for the co-development of products or services with educational institutions (Vrande et al., 2009), government (Lee et al., 2012) and competitors (Parida et al., 2012) generates financial value in these companies.

Likewise, the importance of obtaining knowledge and diversity of technical and scientific ideas through involvement with educational institutions, government and competitors is also highlighted, since the time to acquire the necessary knowledge to face new challenges is reduced, and knowledge is accessed development, accelerating learning curves and ensuring better use of technological capabilities, R&D results, and financial performance (Hagedoorn et al., 2006; Tether, 2003).

Activities involving the acquisition of equipment, machinery, software and supplies also stand out, as they have a considerable impact on financial results. This positive relationship could be due to the fact that acquiring machinery and equipment, software and supplies, as well as carrying out projects outside the value chain, receives more business interest due to its direct implications on financial indicators; For example, collaboration with rivals minimizes risks in project development and allows sharing of resources, improving times, costs and financial indicators (Alvarez-Aros & Bernal-Torres, 2017; Lee et al., 2010; Mazzola et al., 2016).

In addition to the above, a final element to consider is participation in networks for the exchange of experiences with academic institutions, government and competitors, since it allows improving the formalization of communication with external agents and, in turn, establishing organizational limits that guarantee a collaboration oriented towards joint R&DI+D and innovation achievements, impacting on better financial performance (Chesbrough, 2015; Muller & Hutchins, 2012; Ollila & Yström, 2015).

Table 4. Estimated results

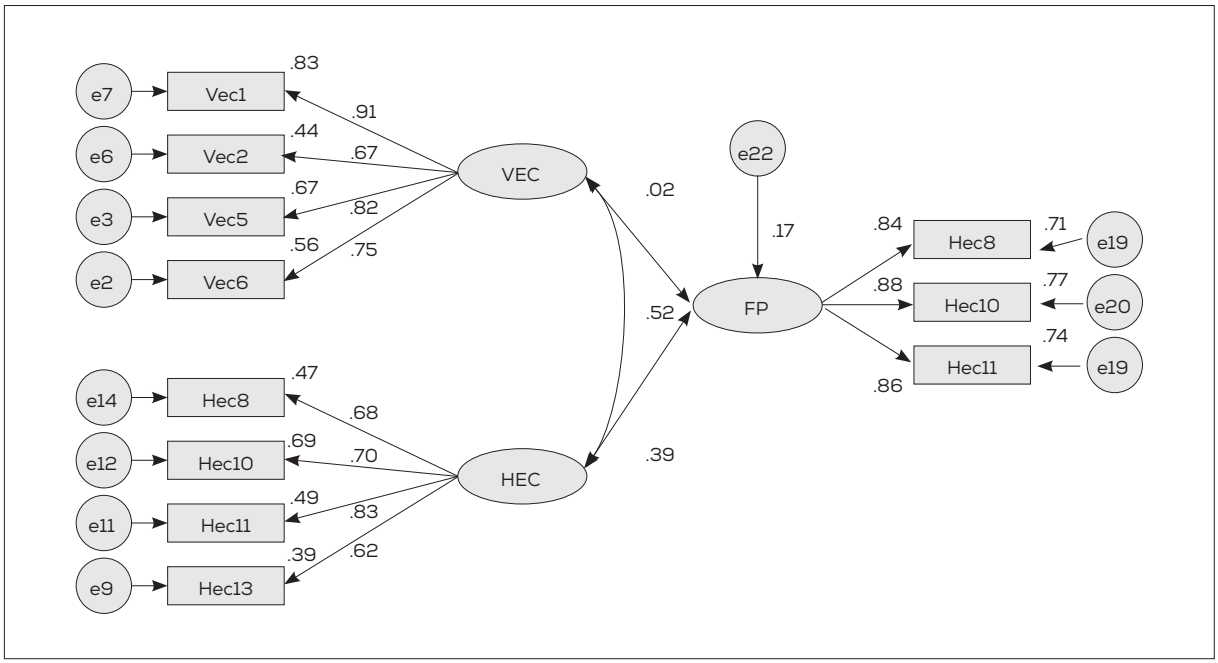
Hypothesis	Endogenous variables relationship			Standardized estimates	S.E.	C.R.	P value
H1a	Financial performance	<--	VEC	0.022	0.102	0.214	0.831
H1b	Financial performance	<--	HEC	0.452	0.139	3.241	0.001

Source: Own elaboration based on the results from AMOS.

Complementary to Table 4, Figure 3 shows the standardized results of the structural model, of the relationships between the items of the vertical and horizontal external collaborations of SMEs with different exogenous agents, and the relationship of these collaborations with financial performance. The determination coefficient (R^2) of the model is observed with a value of 0.17, which represents those external collaborations explain 17% of financial performance. This coefficient is classified as weak according to Chin (1998), being less than 0.19, therefore, the predictive value of the model is low and represents a limitation of the work.

However, it should be noted that financial performance is a complex construct that is explained by different variables related to the operation of each organization and the same environment that surrounds the companies, and that have been addressed in the organizational literature. Therefore, this research only tries to determine the part of the variance of financial performance explained by external collaboration. In this regard, Hair et al., (2014) point out that in a model with only two independent variables and with a sample size less than 250, a coefficient of determination (R^2) of 13% is considered statistically significant.

Figure 3. Standardized structural model



Source: Own elaboration based on the results from AMOS.

CONCLUSIONS

This study contributes to a better understanding of open innovation activities, specifically vertical and horizontal external collaboration, and their relationship with financial performance. Regarding H1a, little positive and non-significant relationship was found between vertical external collaboration with customers, suppliers and users, with financial results (Belderbos et al., 2010; Inauen & Schenker-Wicki, 2011).

This probably stems from the fact that the majority of the sample of companies in the northern border are not industrial companies with a technological profile, since they belong mainly to the commercial sector, where they are limited to a collaborative configuration of basic deals with users, clients and suppliers; and more informal business deals that do not stand out from the operational routine and become irrelevant for that sector (Huang, Krull, & Ziedonis, 2020; Pipkin, 2018; Raposo et al., 2014).

The other hand, from the H1b, as a novel result, a positive and significant relationship was confirmed from the approach of horizontal external collaboration of open innovation (education institutions, government and competitors) in relation to financial performance indicators. This shows the main contribution of the study, due to the importance of involvement activities with these external agents, from the perspective of the theory of the reduction of transactional costs, such as the co-development activities of products and services, the obtaining of knowledge and ideas from the environment to improve R&D and innovation.

Also noteworthy are the acquisition of machinery, equipment, software and supplies, as well as the networks for the exchange of experiences regarding the financial results of SMEs (Buganza & Verganti, 2009; Lee et al., 2010, 2012).

Therefore, this research contributes to the reflection on the awareness of the owners and managers of SMEs in collaborative work with agents inside and outside the environment in open innovation. This represents a strategy to be promoted for the configuration of the competitive capacity of businesses and in the role of the limited market, where SMEs usually operate that seem not to be forced to carry out collaborative activities with external actors. Said strategy to be promoted would undoubtedly improve the contextual role where SMEs carry out their activity, especially in an emerging economy, where the culture of collaborative work is still incipient.

This is in contrast to the broad markets where large companies in developed economies operate, where collaborative work is constantly required to innovate and enhance competitive capacity (García-Vidales et al., 2019; Stanisławskiy, 2020). This indicates that collaborative work in SMEs in emerging economies is determined by managers' awareness of the role of the environment, the size of the market and the context where the market is developing.

These results are added to other investigations that emphasize the need to investigate more in this regard, especially in emerging economies such as Mexico or undeveloped economies, as is mostly the case in Latin America (Scott & Chaston, 2013). Therefore, the findings so far are inconclusive regarding the use of horizontal and vertical external collaborations to improve financial performance in SMEs.

From the above, it is important to highlight that the search and acquisition of inputs, the use of exogenous sources and external collaboration are incoming open innovation strategies, so these activities could be within the reach of any sector, be it commercial, industrial or of services. This is because the practices of incoming open innovation are more oriented to obtain intangible resources from the exogenous environment (Alvarez-Aros & Álvarez-Herrera, 2018).

Evidence is also provided for business decision-making, the directors of government entities responsible for stimulating these companies and academics interested in the subject, since a joint effort is required to continue exploring the different interactions between external agents, taking into account elements such as the breadth and depth necessary in said collaborations, which allow a mutual benefit between company and society.

Regarding the limitations of the study, it is important to mention that the results obtained and the proposals are valid only for the analyzed sample, and cannot be generalized. In addition, this work leaves aside activities such as information disclosure, intellectual property, licensing, and joint projects, which are activities typical of outgoing or mixed open innovation strategies, if they are complemented with the incoming strategy, and represent a future agenda as established by other works (Alvarez-Aros & Bernal-Torres, 2017).

Finally, other future lines of research are to continue studying the issue of external open innovation collaborations in border cities of emerging or undeveloped economies of multiple business sectors, with longitudinal studies and also considering other external agents such as banking institutions, private research centers, among others.

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AUTHORS' CONTRIBUTIONS

Erick Leobardo Alvarez-Aros, César Augusto Bernal-Torres, and Yesenia Sánchez Tovar worked on the conceptualization and theoretical-methodological approach. The theoretical review was carried out by Erick Leobardo Alvarez-Aros, and César Augusto Bernal-Torres. Erick Leobardo Alvarez-Aros coordinated the data collection and the first methodological analysis. The second data and methodological analysis was reworked Yesenia Sánchez Tovar. All the authors worked together in the writing results and conclusions, and final revision of the manuscript.

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THE ROLE OF OVERQUALIFICATION, DECISION, AND MINDFULNESS ON KNOWLEDGE OUTCOMES

O papel da sobrequalificação, da tomada de decisão e da atenção plena nos resultados do conhecimento

El papel de la sobrecualificación, la toma de decisiones y la atención plena en los resultados del conocimiento

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ABSTRACT

This study theorizes that perceived over-qualification (POQ) may impact non-knowledge sharing outcomes such as knowledge hoarding and hiding. We cast participation in decision-making (PDM) and mindfulness on these links by exploring the 3-way interaction effects of POQ, PDM, and mindfulness on nurses' knowledge hoarding and hiding. The research hypotheses were tested using data from a field sample of 379 nurses in Jordan, who responded to an online survey. Results indicate that nurses with high POQ are more likely to exhibit (a) knowledge hoarding and (b) knowledge hiding. Consequently, nurses with high POQ are less likely to exhibit (c) knowledge hoarding when PDM and mindfulness perceptions are high, but not when PDM and mindfulness perceptions are low, and (d) knowledge hiding when PDM and mindfulness perceptions are high, but not when PDM and mindfulness perceptions are low. Implications for the literature and practice are offered.

Keywords: knowledge, hoarding e hiding, over-qualification, decision-making, mindfulness.

RESUMO

O presente estudo teoriza que a sobrequalificação percebida (SQP) pode afetar os resultados do não compartilhamento de conhecimento (como nos casos de acumulação e ocultação de conhecimento). Observa-se a participação na tomada de decisão (PTD) e a atenção plena (ATP) (mindfulness) nessa relação, explorando os efeitos da interação em três vias, representadas pela SQP, PTD e ATP na acumulação e ocultação do conhecimento por parte de profissionais de enfermagem. As hipóteses de pesquisa foram testadas usando dados de uma amostra de campo de 379 profissionais de enfermagem da Jordânia, que responderam a uma pesquisa online. Os resultados indicam que enfermeiros com alta SQP são mais propensos a apresentar (a) acumulação e (b) ocultação de conhecimento. Consequentemente, enfermeiros com alta SQP são menos propensos a exibir (c) acumulação de conhecimento quando PTD e ATP são elevadas, mas não quando ambas são baixas, e (d) ocultação de conhecimento quando PTD e ATP são altas, mas não quando ambas são baixas. O artigo oferece ainda implicações para a literatura e a prática no campo..

Palavras-chave: *conhecimento, acumulação e ocultação, sobrequalificação, tomada de decisão, atenção plena.*

RESUMEN

El presente estudio teoriza que la POQ puede afectar los resultados del no intercambio de conocimientos (como el acaparamiento y el ocultamiento de conocimientos). Proyectamos la participación en la toma de decisiones (PDM) y la atención plena (ATP) –mindfulness– en estos vínculos mediante la exploración de los efectos de una interacción de tres vías representadas por la POQ, PDM y ATP en el acaparamiento y la ocultación de conocimientos por parte de los profesionales de enfermería. Probamos nuestras hipótesis utilizando una muestra de campo de 379 profesionales de enfermería, en Jordania, que respondieron a una encuesta online. Los resultados indican que los respondientes con alta POQ tienen más probabilidades de exhibir conductas de (a) acaparamiento de conocimientos y (b) ocultación de conocimientos. En consecuencia, los profesionales de enfermería con una alta POQ tienen menos probabilidades de exhibir conductas de (c) acaparamiento de conocimientos cuando las percepciones de PDM y ATP son altas, pero no cuando ambas son bajas, y (d) ocultación de conocimientos cuando las percepciones de PDM y ATP son altas, pero no cuando ambas son bajas. Este estudio ofrece, asimismo, implicaciones para la literatura y la práctica.

Palabras claves: *conocimiento, acaparamiento y ocultación, sobrecualificación, toma de decisiones, mindfulness.*

INTRODUCTION

The COVID-19 pandemic has overwhelmed health institutions, increasing labor shortage, stress, and pressure on front-line workers while on the job (Alnazly, Khraisat, Al-Bashaireh, & Bryant, 2021). This has been offset by the urgent need for medical professionals to return to work after retirement or career breaks and the recruitment of new healthcare professionals, including nurses. The Jordanian government and private health institutions had to recruit new nurses and healthcare workers, and they have asked retired ones to return to work to meet the growing demand (Algunmeeyn, El-Dahiyat, Altakhineh, & Azab, 2020; Al-Khalidi, 2020). This recruitment and return strategy provided some relief for healthcare institutions and incumbent health professionals, but it also brought several pressing issues to the fore, such as perceived over-qualification (POQ) among nurses and healthcare professionals. POQ is a situation in which nurses' qualifications—such as education, work experience, and skills—exceed those required for the job (Erdogan & Bauer, 2009; Maynard, Joseph, & Maynard, 2006). POQ has been associated with a reduced job and life satisfaction, a reduction in organizational commitment (Erdogan, Karaeminogullari, Bauer, & Ellis, 2020; Wassermann & Hoppe, 2019; Zheng & Wang, 2017), and increased withdrawal and turnover intentions (Erdogan & Bauer, 2009; Maynard & Parfyonova, 2013). Knowledge management and sharing are lifelines for operational excellence (Asurakkody & Kim, 2020; Vignochi, Goncalo, & Lezana, 2014), and past research mostly emphasizes health professionals' knowledge sharing and dissemination (Anselmann & Mulder, 2020; Li-Ying, Paunova, & Egerod, 2016). Unfortunately, non-sharing behaviors such as knowledge hiding and hoarding are underexplored in the health sector, especially concerning nurses. Unlike knowledge sharing, knowledge hiding, and hoarding is a strategy devised to withhold knowledge from others for a variety of reasons, including distrust, time constraints, power loss, and status protection within an organization (Connelly & Zweig, 2015; Holten, Hancock, Persson, Hansen, & Høgh, 2016).

Mindfulness is a novel attribute that helps increase resilience among workers, which is believed to assist in avoiding falling prey to undesirable feelings at work, such as burnout, hurt feelings, negativity, and the like (Anasori, Bayighomog, & Tanova, 2020; Bajaj, Gupta, & Pande, 2016). Besides its direct mitigating role, mindfulness is a novel trait that has proven to be a strong buffer against undesirable work outcomes (Anasori et al., 2020; Daubenmier, Hayden, Chang, & Epel, 2014). Several studies noted that employees' participation in decision-making (PDM) enhances positive feelings and facilitates empowerment, job satisfaction, employee control, and innovation (Cheng, Song, & Li, 2017; Da'as, 2019). Ding and Shen (2017) recommend additional investigation into the moderating role of PDM. Goñi-Legaz and Ollo-López (2017) documented that PDM increases job satisfaction and buffers the negative effects associated with job satisfaction in temporary contracts. Building on extant discussions, the research argues that mindfulness and PDM may buffer the adverse effects of POQ on hiding and hoarding behaviors. The contributions in this paper are four-folds. First, this work moves beyond the predominant linking of POQ with desired organizational outcomes, such as knowledge

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sharing, by linking it with knowledge hiding and hoarding behaviors. Technically, this paper extends and provides further evidence on inconclusive findings concerning POQ literature on nurses and other healthcare professionals. Second, this paper contributes to the literature by recognizing the importance of participation and mindfulness within POQ boundaries, shifting the principal focus beyond job autonomy (Ding & Shen. 2017; Goñi-Legaz & Ollo-López, 2017; Wu, Luksyte, & Parker, 2015) and toward the combination of internal personal resources (i.e., mindfulness) and external work resources (i.e., PDM). Third, existing POQ arguments and empirical evidence are mostly in other sectors (Erdogan et al., 2020; Maynard & Parfyonova, 2013; Triana, Trzebiatowski, & Byun, 2017; Wassermann & Hoppe, 2019); this work contributes from the lens of nursing management and HR practices. Last, there are several theoretical propositions stating that boundary conditions matter when it comes to the causal relationship of POQ and work outcomes. This paper is novel in that it proposes a three-way interaction effect of POQ, PDM, and mindfulness on knowledge hiding and hoarding. In doing so, we have responded to a call for contextual factors in research offered by (Erdogan et al., 2020; Wu et al., 2015), from both a theoretical and practical point of view.

LITERATURE REVIEW AND HYPOTHESES

Perceived over-qualification, knowledge hiding, and hoarding behaviors

Nurses' and healthcare workers' knowledge of how their knowledge, skills, and abilities (KSAs) outweigh the demands of their work is referred to as perceived over-qualification (Erdogan & Bauer, 2009). Perceived over-qualification (POQ) creates a type of underemployment where "the individual has surplus skills, knowledge, abilities, training, experience and other qualifications that are not required by or utilized on the job" (Erdogan, Tomás, Valls, & Gracia 2018, p. 217). The conceptualization of over-qualification is twofold: objective and perceived over-qualification. The former is the more objective, fair, and unbiased form of assessment, whereas the latter is completely subjective. Nurses' qualifications (e.g., KSAs) are compared to requirements stated in the job description to determine objective over-qualification (Martinez, Lengnick-Hall, & Kulkarni, 2014), while nurses' personal opinions about their underutilization are referred to as POQ (Erdogan et al., 2018). Over-qualification can be assessed objectively by managers and decision-makers, and as such, has fewer attitudinal and behavioral consequences as opposed to perceived over-qualification. Several studies documented that POQ is a source of undesired work outcomes (Maynard & Parfyonova, 2013). Despite ample empirical claims, the literature is undercooked alongside mixed results and assumptions on the consequences of POQ. Some scholars purport that POQ enhances withdrawal behaviors (Triana et al., 2017) and knowledge sharing (Zhang, Li, & Cao, 2017). Others suggest that POQ reduces extra-role behaviors (Erdogan et al., 2020), life satisfaction (Wassermann & Hoppe, 2019), commitment, and job performance (Zheng

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& Wang, 2017). Knowledge hiding and hoarding are particularly virulent forms of reluctance to share knowledge in the workplace (Connelly, Zweig, Webster, & Trougakos, 2012; Holten et al., 2016). Knowledge hiding and hoarding behaviors embody the cessation of the nurses, filtering the knowledge to share or withholding information from their peers. These are distinct concepts with theoretical and empirical evidence. Connelly et al. (2012) denoted that scope, request, and intentionality are distinguishing factors between hiding and hoarding.

I. Knowledge hoarding is a less-intentional type of concealment as only unrequested knowledge is concealed from others, while hiding is an intentional type of concealment, where both requested and unrequested knowledge is concealed from others (Connelly & Zweig, 2015; Holten et al., 2016).

II. Knowledge hoarding has a smaller behavioral scope than knowledge hiding (Connelly & Zweig, 2015; Holten et al., 2016).

III. Knowledge hoarding is comprised of facets of the knowledge that are not necessarily explicit or known to others, thereby limiting the seekers' ability to know or make requests, yet this is essential for organizational success and performance (Evans, Hendron, & Oldroyd, 2014).

The reasons for knowledge hiding and hoarding by members of an organization include safeguarding personal competence, an unwillingness to invest time, fear of knowledge parasites, the avoidance of exposure and power control, injustices, mistreatment in the workplace, and poor-quality work relationships (Abubakar, Behravesh, Rezapouraghdam, & Yildiz, 2019; Aljawarneh, Alomari, Alomari, & Taha, 2020; Connelly, Černe, Dysvik, & Škerlavaj, 2019; Connelly & Zweig, 2015; Holten et al., 2016). In the context of this study, overqualified nurses are likely to develop negative feelings toward their peers and distance themselves in an elitist manner. Past discoveries showed quitting as a final resort to resolving a poor fit, synonymous with POQ (Follmer, Talbot, Kristof-Brown, Astrove, & Billsberry, 2018). Superior knowledge grants nurses an advantage, which explains the motive to withhold information for personal gain to avoid potential losses and maintain relative status as compensation for their ill-fitting placement (Li, Liao, & Han, 2021). Nurses with high POQ are less willing to put forth their best efforts in collaboration and information sharing due to the perception of being under-rewarded or under-recognized. Thus, they conceal knowledge from others to showcase and portray ownership of their superior and valuable skills.

H1: Perceived over-qualification will positively influence knowledge hoarding among nurses.

H2: Perceived over-qualification will positively influence knowledge hiding behavior among nurses.

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Moderating role of participation in decision-making and mindfulness

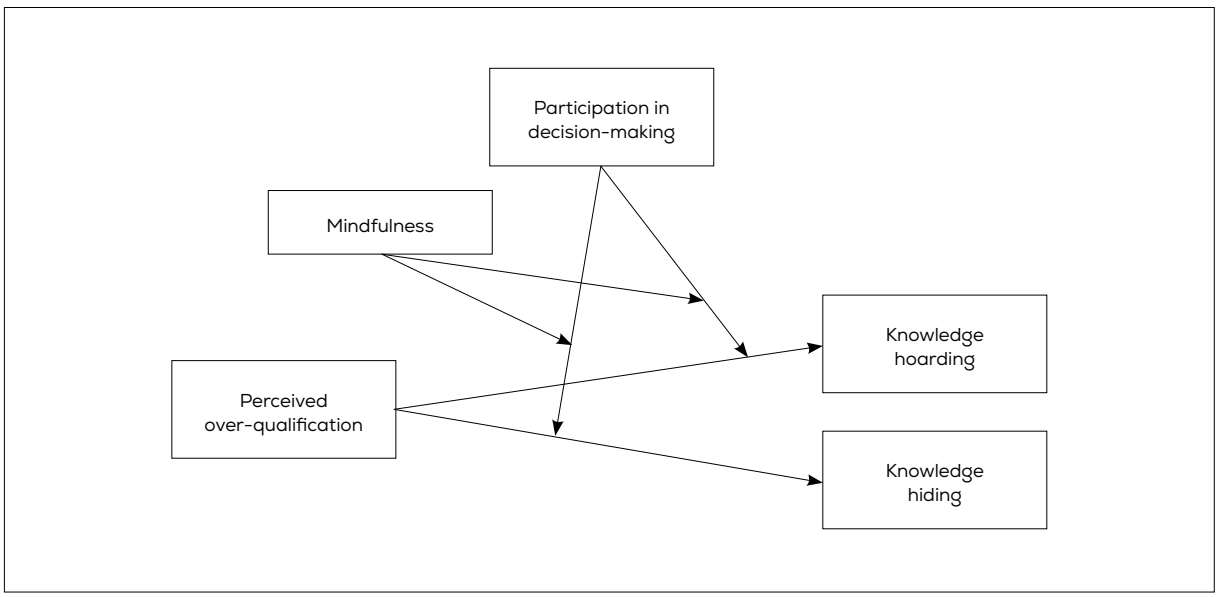
Conventionally, mindfulness has been portrayed as "the clear and single-minded awareness of what actually happens to us and in us at the successive moments of perception" (Thera, 1972, p. 5), or as "keeping one's consciousness alive to the present reality" (Hanh, 1976, p. 11). Mindfulness depicts one's cognizance of internal and external affairs and events as phenomena, "rather than as the objects of a conceptually constructed world" (Olendzki, 2005, p. 253). In essence, mindfulness permits an "immediacy of direct contact with events as they occur, without the overlay of discriminative, categorical, and habitual thought, consciousness takes on a clarity and freshness that permits more flexible, more objectively informed psychological and behavioral responses" (Brown, Ryan, & Creswell, 2007, p. 215). Mindfulness, described as one's conscious attention to the environment and present moment (Brown & Ryan, 2003), is an individual attribute that can influence how individuals are affected by negative environments.

The central aim of involving employees in decision-making is to gain from the knowledge, know-how, and skills of employees in modern organizations. Participation in decision-making (PDM) is a process whereby planning, problem-solving, and related activities are carried out jointly with managers and employees (Valoyi, Lessing, & Schepers, 2000) in the form of organizational democratic values designed to promote equity, shared responsibility in making decisions, and joint governance with superiors and subordinates to improve organizational goals (Behravesh, Abubakar, & Tanova, 2020). Not only does PDM grant workers direct control, but it also puts forth a discretionary effort, resulting in superior performance (Sun, Aryee, & Law, 2007). It is also important to note that participation does not always motivate, nor does a lack of participation always demotivate (Valoyi et al., 2000). Past work found that PDM has buffering capability toward unwanted work outcomes (Ding & Shen, 2017; Goñi-Legaz & Ollo-López, 2017). Shared decision-making among healthcare workers has produced positive work outcomes in various countries (Joseph-Williams et al., 2017; Rodrigues, Barrichello, & Morin, 2016). It can be argued that allowing employees to exert some level of influence on work processes and decisions enhances positivity, commitment, innovation, satisfaction, and information sharing and collaboration (Aslam, Muqadas, & Imran, 2018; Cheng et al., 2017; Da'as, 2019). On the other hand, job autonomy can buffer the negative effects of over-qualification on employee well-being in European countries, and the authors recommend testing other buffers on similar relationships in non-Western countries, such as Jordan (Wu et al., 2015). Several researchers argued that identifying moderators addressing the repercussions of POQ on attitude and behavior (Erdogan et al., 2020; Erdogan & Bauer, 2009; Wu et al., 2015) ensures organizations take advantage of employees' POQ. Sesen and Ertan (2019) also suggested buffering factors reducing POQ are required. We, therefore, respond to the call for more research on theory-based moderators by combining PDM and mindfulness as buffers on the link between POQ and knowledge hiding and hoarding.

H3: Employee participation in decision-making and mindfulness moderates the relationship between perceived over-qualification and knowledge hiding among nurses.

H4: Employee participation in decision-making and mindfulness moderates the relationship between perceived over-qualification and knowledge hoarding among nurses.

Figure 1. Hypothesized research model



METHODOLOGY

Research instruments

The research model is comprised of five distinct constructs adapted from past studies and operationalized to fulfill the objectives of this study. The constructs, sources, and scales are described in the succeeding paragraphs. Perceived over-qualification (POQ) was measured using the Maynard et al. (2006) nine-item scale. Participation in decision-making (PDM) was measured using the Sun et al. (2007) four-item scale. knowledge hiding behavior (KHB) was measured using the Connelly et al. (2012) twelve-item scale with sub-dimensions (evasive hiding, rationalized hiding, and playing dumb). Knowledge hoarding (KHR) was measured using the Evans et al. (2014) four-item scale. Participants evaluated the extent of their hoarding behaviors and experiences. Mindfulness (MND) was measured using the Brown and Ryan (2003) fifteen-item scale. Employees' states of mindfulness were generated by reverse scoring the items prior to analysis. Demographic information of participating nurses—such as gender, age, educational level, organizational tenure, and type of health institution (i.e., private or public)—were also obtained. This information was used as control variables during the analysis. POQ, PDM, and

knowledge hoarding and hiding were anchored using a seven-point scale, where 1=strongly disagree, and 7=strongly agree, while MND was anchored on a six-point scale, where 1=almost never and 6=almost always. The survey items are shown in Exhibit 1.

Exhibit 1. Survey items

Perceived overqualification
1. "My job requires less education than I have"
2. "The work experience that I have is not necessary to be successful on this job"
3. "I have job skills that are not required for this job"
4. "Someone with less education than myself could perform well on my job"
5. "My previous training is not being fully utilized on this job"
6. "I have a lot of knowledge that I do not need in order to do my job"
7. "My education level is above the education level required by my job"
8. "Someone with less work experience than myself could do my job just as well"
9. "I have more abilities than I need in order to do my job"
Knowledge hoarding
1. "I keep news about what I am doing secret from others until the appropriate time"
2. "I avoid releasing information to others in order to maintain control"
3. "I control the release of information in an effort to present the profile I want to show"
4. "Information is a resource that needs to be carefully guarded"
Knowledge hiding
Evasive hiding
1. "Agreed to help him/her but never really intended to"
2. "Agreed to help him/her but instead gave him/her information different from what s/he wanted"
3. "Told him/her that I would help him/her out later but stalled as much as possible"
4. "Offered him/her some other information instead of what he/she really wanted"
Playing dumb
1. "Pretended that I did not know the information"
2. "Said that I did not know, even though I did"
3. "Pretended I did not know what s/he was talking about"
4. "Said that I was not very knowledgeable about the topic"

Continue

Exhibit 1. Survey items

Concludes

Knowledge hiding
Rationalized hiding
1. "Explained that I would like to tell him/her, but was not supposed to"
2. "Explained that the information is confidential and only available to specific people"
3. "Told him/her that my boss would not let anyone share this knowledge"
4. "Said that I would not answer his/her questions"
Participation in decision-making
1. "Employees in this job are often asked by their supervisor to participate in decisions"
2. "Individuals in this job are allowed to make decisions"
3. "Employees are provided the opportunity to suggest improvements in the way things are done"
4. "Supervisors keep open communications with employees in this job"
Mindfulness -
1. "I could be experiencing some emotion and not be conscious of it until sometime later"
2. "I break or spill things because of carelessness, not paying attention, or thinking of something else"
3. "I find it difficult to stay focused on what's happening in the present"
4. "I tend to walk quickly to get where I'm going without paying attention to what I experience along the way"
5. "I tend not to notice feelings of physical tension or discomfort until they really grab my attention"
6. "I forget a person's name almost as soon as I've been told it for the first time"
7. "It seems I am "running on automatic" without much awareness of what I'm doing"
8. "I rush through activities without being really attentive to them"
9. "I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there"
10. "I do jobs or tasks automatically, without being aware of what I'm doing"
11. "I find myself listening to someone with one ear, doing something else at the same time"
12. "I drive places on "automatic pilot" and then wonder why I went there"
13. "I find myself preoccupied with the future or the past"
14. "I find myself doing things without paying attention"
15. "I snack without being aware that I'm eating"

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Sampling and data collection method

The adapted research instruments were originally in English, and since most Jordanian nurses use official Arabic to carry out their duties, researchers translated instruments from English to Arabic with the help of professional translators, who employed a back-translation technique. To ensure the correctness of the translation regarding language and cultural cues, a pretest with 20 nurses showed that the instruments were clear and free of ambiguities. The research sample was obtained using a probabilistic approach, so each nurse in the population of interest was identified and had an equal chance of being included in the sample. This sampling approach is known as the simple random sampling technique. Participants were asked not to disclose their identities to reduce the potency of common method bias (CMB), highlighted by Podsakoff, MacKenzie, and Podsakoff (2012). An online survey was used to increase the nurses' perception of anonymity. The survey link was sent via email and other outlets, such as WhatsApp groups, by HR officers. According to The Hashemite Kingdom of Jordan Ministry of Health (2019), there were registered nurses (25,326), associate degree nurses (4,783), and assistant nurses (1,713). In total, 17 hospitals participated in the study (eight private and nine public), and a total of 379 usable responses were retrieved. The obtained sample size appeared to be adequate, given the population and sampling methodology.

Choice for analytical methods

Partial least squares structural equation modeling (PLS-SEM) is a method to deal with and handing models with constructs in formative and reflective format, respectively. Unlike covariance-based structural equation modeling (CB-SEM), PLS-SEM can work with both small and large sample sizes and non-normal data, and its statistical assumptions are not strict compared to CB-SEM. Prediction-oriented PLS-SEM evaluation is not susceptible to model misspecification; it is also fruitful for exploring relationships with weak theoretical foundations (Hair, Hult, Ringle, & Sarstedt, 2016; Henseler, Ringle, & Sarstedt, 2015). These assets of PLS-SEM make it suitable for studying model variables. We examine the estimated parameters in the research models with the help of SmartPLS and Hayes's Process Macro applications on a two-step approach: (1) a measurement model for the suitability and validity and/or reliability of the instruments, and (2) a hypothesized model for causational inference of the three-way interaction affects, as this technique is not available in SmartPLS.

ANALYSIS AND RESULTS

Information about the sample

The participants' information is described as follows: 45.9% are male nurses, and 54.1% are female nurses. Approximately 12.7% are within the 21 and 30 age group, 54.1% are within

the 31 and 40 age group, 26.9% are within the 41 and 50 age group, and the rest are above 50 years old. Approximately 12.7% have diplomas, 60.4% have bachelor's degrees, and 26.9% have postgraduate degrees. Approximately 12.4% have been working for less than four years, 39.3% have been working for between five and nine years, and 48.3% have been working for more than ten years. Finally, 53.6% work in public hospitals, and 46.4% work in private hospitals.

Measurement model

As a first step, we sufficiently evaluated the measurement model in terms of the scale items' factor loadings and significance levels based on the 0.50 and 1.960 thresholds (see Table 5 for details). In essence, we removed the scale items having a low/cross-loading, and the average variance extracted (AVE) for each variable was within the 0.50 threshold (Hair et al., 2016; Henseler et al., 2015). Next, the internal consistency reliability of the constructs was evaluated using Cronbach's alpha (Cα) and composite reliability (CR) indicators. As Table 1 reports, the estimates were above the 0.70 benchmarks for Cα and CR, respectively. These results demonstrate the existence of convergent validity and construct reliability. Following that, we looked at the discriminant validity; AVE-value square roots should be greater than the correlation estimates in a model with discriminant validity (Fornell & Larcker, 1981) after comparing the AVE-value square roots for constructs with the correlation estimate between them. In Table 1, the AVE-value square roots (the diagonal value) are greater than the correlation estimates (lower triangular matrix) (Hair, Sarstedt, Ringle, & Gudergan, 2017). As Table 1 reports, the newly introduced heterotrait-monotrait ratio of correlations (HTMT) for discriminant validity were evaluated, and the correlation estimates (upper triangular matrix) were all below the 0.90 benchmarks (Henseler et al., 2015). These results demonstrate the non-existence of discriminant validity.

Table 1. Measurement model matrix

	Variables	Cα	Rho	CR	AVE	1	2	3	4	5
1	POQ	0.93	0.94	0.94	0.64	0.80	0.18	0.14	0.32	0.49
2	PDM	0.84	0.87	0.89	0.67	-0.14	0.82	0.41	0.09	0.25
3	MND	0.90	0.92	0.92	0.54	-0.12	0.37	0.73	0.23	0.46
4	Knowledge hoarding	0.90	0.93	0.93	0.77	0.32	-0.03	-0.21	0.88	0.59
5	Knowledge hiding	0.97	0.97	0.97	0.73	0.49	-0.23	-0.44	0.55	0.86

Information: Cα = Cronbach's alpha; CR= composite reliability index; AVE= average variance extracted.
Lower triangular matrix is the Fornell-Larcker criterion coefficients.
Upper triangular matrix is the HTMT coefficients.
Middle bold value is the square root of AVE

Source: Prepared by the authors from data obtained from the Smart PLS software (2022).

As a popular multi-collinearity indicator, variance inflation factors (VIF) measure the extent to which the variance of a predictor on a response variable is inflated by other predictors. As Table 2 reports, the issue of multi-collinearity is dismissed, given that VIF were less than five. CMB was tested statistically using the Harman one-factor test, where the explained variance for combined factors is expected to be less than 50%. We found that the combined factors only explained 34.5% of the variance, dismissing the threat of CMB (Podsakoff et al., 2012).

Table 2. Collinearity information

	Predictor Variables	Knowledge hoarding	Knowledge hiding
1	POQ	1.025	1.025
2	PDM	1.171	1.171
3	MND	1.164	1.164

Information: VIF values

Source: Prepared by the authors from data obtained from the Smart PLS software (2022).

Hypothesized model

After establishing the reliability and validity of the measurement model, latent variable scores were obtained from SMARTPLS software at the end of measurement model testing. The research model was tested using Hayes's Process Macro Model-3 with 5,000 bootstrap runs. The test for the three-way interaction effect was administered following experts' suggestions (Aiken, West, & Reno, 1991). Control variables—such as gender, age, educational level, tenure, and type of organization (i.e., private or public hospitals)—were entered into the equation alongside the main predictors: POQ, PDM, and mindfulness and their interaction terms.

DISCUSSION

Research findings

The findings are presented in Tables 3 and 4. For the main direct effects, POQ exerted positive and significant effects on knowledge hoarding ($\beta = 0.32$; $t = 5.93$; $\rho < 0.01$) and knowledge hiding ($\beta = 0.41$; $t = 9.77$; $\rho < 0.01$). This suggests that nurses who perceive themselves as overqualified are prone to hoard and hide knowledge from other nurses. Simply, a one-unit increase in POQ results in a 0.32 unit increase in knowledge hoarding and a 0.41 unit increase in knowledge hiding. These findings support hypotheses H1 and H2. As shown in Table 3, results revealed a three-way interaction between POQ, PDM, and mindfulness toward knowledge hoarding ($\Delta R^2=0.03$; $F=13.47$; $df1=1.00$; $df2=366.00$; $p<0.01$), significant with ($\beta = -0.16$; $t = -3.67$; $\rho <$

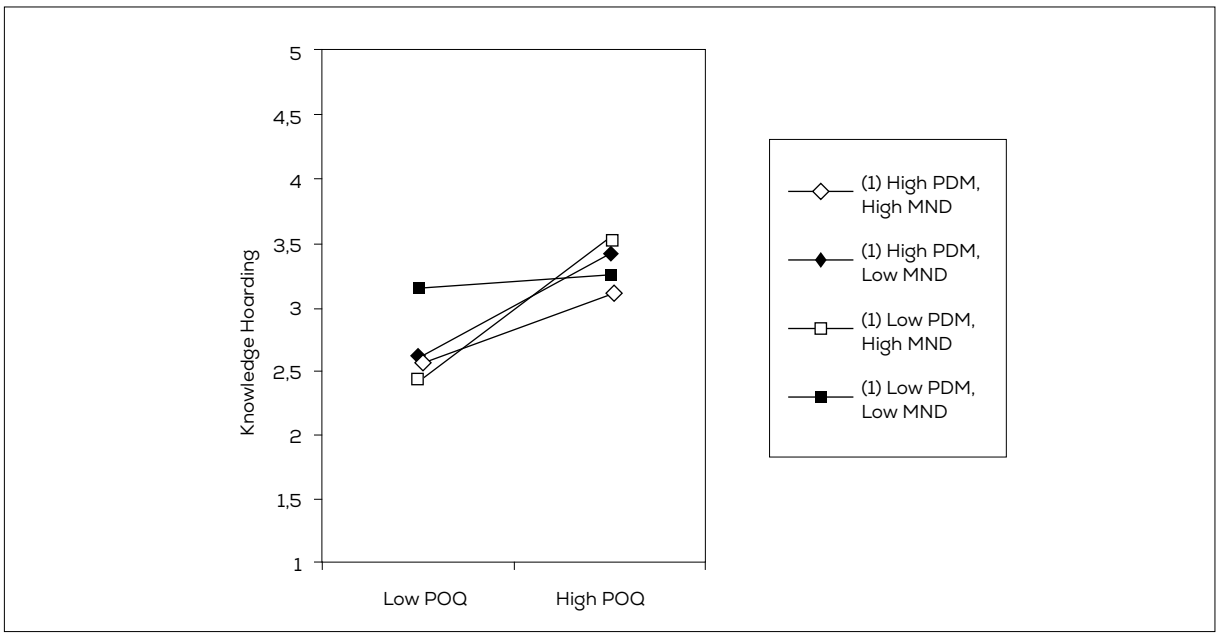
0.01). The results showed that a high PDM and mindfulness buffers the positive relationship between POQ and knowledge hoarding. When POQ is high, lower levels of knowledge hoarding occur when both PDM and mindfulness are high. This finding supports hypothesis H3. Figure 2 shows the nature of the interactions.

Table 3. The 3-way interaction effects on knowledge hoarding

Predictor(s)	Coefficient	SE	t-value	p-value	LLCI	ULCI
Constant	-0.95	0.33	-2.91	0.00	-1.60	-0.31
Gender	0.60	0.10	5.91	0.00	0.40	0.81
Age	0.41	0.08	5.00	0.00	0.25	0.57
Education	-0.01	0.08	-0.11	0.91	-0.16	0.15
Tenure	-0.27	0.09	-3.06	0.00	-0.45	-0.10
Hospital type	-0.17	0.10	-1.62	0.11	-0.37	0.04
POQ	0.32	0.05	5.93	0.00	0.22	0.43
PDM	-0.08	0.06	-1.34	0.18	-0.19	0.04
MND	-0.09	0.05	-1.66	0.10	-0.19	0.02
POQ*PDM	0.02	0.06	0.32	0.75	-0.09	0.13
POQ*MND	0.10	0.05	1.81	0.07	-0.01	0.20
PDM*MND	0.01	0.04	0.32	0.75	-0.07	0.10
POQ*PDM*MND	-0.16	0.04	-3.67	0.00	-0.25	-0.07
Information:						
F statistics = 11.87						
R squared = 0.28						
Significance = 0.01						
SE= standard error						
LLCI = lower level confidence interval						
ULCI = upper level confidence interval						

Source: Prepared by the authors from data obtained from the Smart PLS software (2022).

Figure 2. A 3-way interaction plot on knowledge hoarding



As shown in Table 4, the results revealed a three-way interaction between POQ, PDM, and mindfulness toward knowledge hiding (ΔR^2=0.01; F=6.08; df1=1.00; df2=366.00; $\rho < 0.01$), significant with (β = -0.08; t = -2.47; $\rho < 0.01$). The results showed that a high PDM and mindfulness buffer the positive relationship between POQ and knowledge hiding. When POQ is high, lower levels of knowledge hiding occur when both PDM and mindfulness are high. This finding supports hypothesis H4. Figure 3 shows the nature of the interactions.

Table 4. The 3-way interaction effects on knowledge hiding

Predictor(s)	Coefficient	SE	t-value	p-value	LLCI	ULCI
Constant	-0.34	0.25	-1.34	0.18	-0.84	-0.16
Gender	0.27	0.08	3.42	0.00	0.12	0.43
Age	0.40	0.06	6.30	0.00	0.27	0.52
Educação	-0.26	0.06	-4.31	-0.00	-0.38	0.14
Tenure	0.40	0.07	-5.79	0.00	-0.54	-0.26
Hospital type	0.38	0.08	4.81	0.00	0.23	0.54
POQ	0.41	0.04	9.77	0.00	0.33	0.50
PDM	-0.03	0.04	-0.62	0.53	-0.11	0.06
MND	-0.24	0.04	5.73	0.00	-0.32	0.16
POQ*PDM	0.04	0.04	0.87	0.38	-0.05	0.13

Continue

Table 4. The 3-way interaction effects on knowledge hiding

Concludes

Predictor(s)	Coefficient	SE	t-value	p-value	LLCI	ULCI
POQ*MND	0.08	0.04	1.96	0.05	-0.00	0.16
PDM*MND	-0.07	0.03	-2.20	0.03	-0.14	0.01
POQ*PDM*MND	-0.08	0.03	-2.47	0.01	-0.15	-0.02
Information:						
F statistics = 39,77						
R squared = 0.57						
Significance = 0.01						
SE= standard error						
LLCI = lower level confidence interval						
ULCI = upper level confidence interval						

Source: Prepared by the authors from data obtained from the Smart PLS software (2022).

Figure 3. A 3-way interaction plot on knowledge hiding

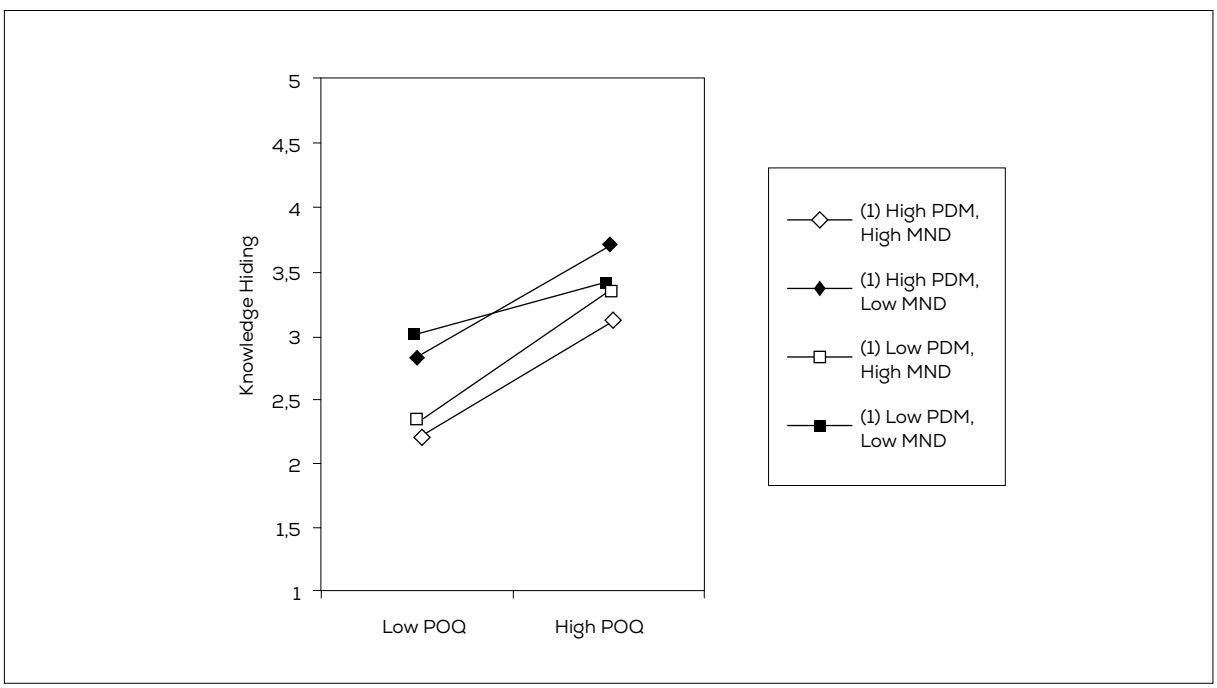


Table 5. Measures descriptive statistics

	O	M	SD	t	ρ
POQ1 <- POQ	0.820	0.820	0.019	42.865	0.000
POQ2 <- POQ	0.718	0.720	0.029	24.769	0.000
POQ3 <- POQ	0.810	0.810	0.022	37.513	0.000
POQ4 <- POQ	0.852	0.853	0.014	62.265	0.000
POQ5 <- POQ	0.731	0.731	0.029	24.807	0.000
POQ6 <- POQ	0.805	0.805	0.025	32.731	0.000
POQ7 <- POQ	0.859	0.859	0.017	50.406	0.000
POQ8 <- POQ	0.839	0.840	0.019	44.504	0.000
POQ9 <- POQ	0.762	0.764	0.034	22.584	0.000
PDM1 <- PDM	0.762	0.757	0.051	14.881	0.000
PDM2 <- PDM	0.819	0.816	0.037	22.385	0.000
PDM3 <- PDM	0.834	0.831	0.038	21.849	0.000
PDM4 <- PDM	0.857	0.852	0.028	30.098	0.000
MND1 <- MND	[*]				
MND2 <- MND	[*]				
MND3 <- MND	0.741	0.742	0.027	27.664	0.000
MND4 <- MND	0.627	0.626	0.039	15.919	0.000
MND5 <- MND	0.747	0.747	0.028	27.138	0.000
MND6 <- MND	0.620	0.618	0.047	13.054	0.000
MND7 <- MND	0.752	0.753	0.029	26.090	0.000
MND8 <- MND	0.796	0.797	0.028	28.441	0.000
MND9 <- MND	0.729	0.726	0.031	23.323	0.000
MND10 <- MND	0.841	0.841	0.016	53.142	0.000

Continue

Table 5. Measures descriptive statistics

Concludes

	O	M	SD	t	ρ
MND11 <- MND	[*]				
MND12 <- MND	[*]				
MND13 <- MND	0.701	0.698	0.036	19.401	0.000
MND14 <- MND	0.735	0.734	0.030	24.817	0.000
MND15 <- MND	[*]				
KHR1 <- KHR	0.876	0.876	0.015	57.113	0.000
KHR2 <- KHR	0.927	0.926	0.010	92.263	0.000
KHR3 <- KHR	0.916	0.915	0.012	78.694	0.000
KHR4 <- KHR	0.780	0.780	0.038	20.776	0.000
KHB1 <- KHB	0.707	0.706	0.035	20.386	0.000
KHB2 <- KHB	0.799	0.799	0.022	36.191	0.000
KHB3 <- KHB	0.891	0.890	0.015	60.736	0.000
KHB4 <- KHB	0.824	0.823	0.020	42.124	0.000
KHB5 <- KHB	0.930	0.930	0.010	89.621	0.000
KHB6 <- KHB	0.907	0.907	0.009	104.715	0.000
KHB7 <- KHB	0.937	0.937	0.006	170.369	0.000
KHB8 <- KHB	0.889	0.889	0.012	75.039	0.000
KHB9 <- KHB	0.873	0.874	0.014	64.641	0.000
KHB10 <- KHB	0.839	0.839	0.018	46.207	0.000
KHB11 <- KHB	0.846	0.846	0.014	62.630	0.000
KHB12 <- KHB	0.790	0.789	0.021	36.949	0.000

Information: *O=Original Sample; M=Sample Mean; SD = Standard Deviation; t=T-Statistics;* ρ*=P-Values; [*] = Excluded Measures*

Source: Prepared by the authors from data obtained from the Smart PLS software (2022).

A sizeable portion of health professionals thinks they are overqualified for their roles. POQ has been labeled problematic with varied consequences (Erdogan et al., 2020). HR scholars are challenged with identifying potential buffers to reduce the ill consequences of POQ. As a new and unstudied phenomenon, little is known about the nexus between POQ, PDM, and mindfulness regarding knowledge outcomes such as hoarding and hiding amidst the COVID-19 pandemic at the outset of this research. This paper fills the void in the literature by examining the three-way interaction effects between POQ, PDM, and mindfulness on knowledge hoarding and hiding. For Hypotheses 1 and 2, this work found that POQ has a positive and significant effect on knowledge hoarding and hiding behaviors. This means that when nurses perceive they are overqualified, they are more likely to hoard and hide knowledge from their peers, including requested (i.e., knowledge hiding) and unrequested (i.e., knowledge hoarding) knowledge. POQ has been shown to have a positive impact on knowledge sharing (Erdogan et al., 2020; Zhang et al., 2017) and knowledge hiding (Li et al., 2021). In line with work in other cultural settings, this work extends by showing that POQ is a predictor for increased knowledge hoarding and hiding behaviors amongst nurses in Jordan. The liberal cultural orientation of Jordanians as opposed to other Arabian nations plays a key role in the findings. Hypothesis 3 suggests that the impact of POQ on knowledge hoarding varies by the degree of PDM and mindfulness. The findings support this prediction by suggesting that when nurses perceive they are overqualified, they tend to have contempt for less qualified nurses, exhibited by the hoarding of knowledge. However, the impact is lesser when PDM and mindfulness are high, such that the overqualified nurses are less sensitive to POQ due to their PDM and mindfulness. Hypothesis 4 suggests the impact of POQ on knowledge hiding varies by the degree of PDM and mindfulness. The findings support this prediction by suggesting that when nurses perceive they are overqualified nurses, they are more likely to have contempt for less qualified nurses, exhibited by the hiding of knowledge. Prior research noted that more qualified and overqualified individuals are less likely to share knowledge with less qualified counterparts (Erdogan et al., 2020), and they might take matters to greater lengths by intentionally hiding knowledge (Li et al., 2021). To expand and complement past work, this research shows the possibility of the interaction effects of PDM and mindfulness on the link between POQ and knowledge hiding and POQ and knowledge hoarding.

Theoretical and managerial implications

The results of this study contribute to POQ and the nursing HR literature in several ways. First, this work contributes to the POQ research stream by focusing on the non-knowledge sharing perspective. In doing so, we identified two related yet distinct consequences. Although a few works have linked POQ with counterproductive behaviors (Maynard & Parfyonova, 2013; Triana et al., 2017; Wassermann & Hoppe, 2019), to our knowledge, this is the first study to look at knowledge hoarding and hiding simultaneously. Our results have shown that POQ is associated with high knowledge hoarding and hiding. This is important as it expands the current knowledge

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of POQ consequences and may help healthcare organizations manage nurses' POQ. Linking POQ with knowledge hoarding and hiding offers a more complex picture, specifically in the Arabian cultural context. This new proposition opens future avenues for conducting an even deeper investigation into POQ effects on non-sharing domains such as knowledge sabotage and interactions with other resourceful concepts. This study also contributes to POQ theory via the three-way interaction effects. Research on potential buffers of POQ on work outcomes is sparse (Alfes, Shantz, & Baalen, 2016). This research developed and tested an empirical model that shows the relevance of PDM and mindfulness in reducing the undesired outcomes of POQ. This research adds to the POQ theoretical framework by identifying conditions attenuating the effects of POQ on work-related outcomes. It is also noteworthy that we have utilized the three-way interaction effects to unveil the proposed associations, as past work mostly tested the effects of two-way interactions (see Alfes et al., 2016; Wu et al., 2015).The results contribute to practice in several ways. The COVID-19 pandemic has created a catastrophe in the healthcare sector; specifically, the Jordanian government and private healthcare institutions have either recruited new nurses or called back retired ones to join their efforts with the incumbent nurses when battling the virus. Unfortunately, the majority of healthcare institutions have HR practices stressing the importance of hiring nurses and healthcare professionals with specific KSAs; this emphasis is mostly highlighted during the recruitment and selection stages. The results of this study illustrate that managers need to consider the KSAs of existing nurses because having a team of nurses with varying KSAs can be problematic given the accrued tendencies of knowledge hoarding and hiding behaviors. Our findings suggest that managers cannot avoid hiring nurses with varying levels of KSAs because more-skilled nurses can bring benefits to the organization. Managing such skills should be prioritized by positioning HR practices so they nourish employees' PDM. Furthermore, nurses should be counseled on how to develop mindfulness, as such abilities can increase their desire to share knowledge with less-qualified peers. Finally, nurses cannot be forced to share knowledge; thus, more qualified nurses may hold negative emotions with respect to the less-qualified ones. To avoid such situations, managers are encouraged to create an atmosphere characterized by mentor-protégé relationships in the form of PDM. If so, overqualified or more qualified nurses will be less likely to hoard or hide knowledge because of the accrued joy and sense of accomplishment in seeing their protégés develop as professionals.

Limitations and further research propositions

The research findings should be viewed with caution due to limitations such as self-reported data, cross-sectional design, and sampling technique. Our recommendation to scholars is to source alternative data rather than utilize self-reported data. The longitudinal and experimental design could be expanded to make up for shortcomings associated with cross-sectional design. The findings cannot be generalized due to the data being focused on a single industry in a single country; this warrants the need for research to replicate this research in other industries or countries. This study did not consider the quality of work relationships, as nurses may hoard

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and hide knowledge from their alienated colleagues. Similarly, it is possible that team cohesion may influence nurses' knowledge hoarding and hiding. Hence, we suggest that future work should gauge how the quality of work and team cohesion shape POQ and related outcomes.

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AUTHOR'S CONTRIBUTION

Bashar Khaled Anayzan Almagharbeh and Shiva Ilkhanizadeh worked on the conceptualization and theoretical-methodological approach. The theoretical review was conducted by BBashar Khaled Anayzan Almagharbeh. Data collection was coordinated by Bashar Khaled Anayzan Almagharbeh. Data analysis included Bashar Khaled Anayzan Almagharbeh. Supervision and rewriting Shiva Ilkhanizadeh. Bashar Khaled Anayzan Almagharbeh e Shiva Ilkhanizadeh worked together in the writing and final revision of the manuscript.

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MASCULINITIES AND FEMININITIES IN THE SKY: THE GENDER PROJECT(S) OF FLIGHT ATTENDANTS' CAREERS

Masculinidades e feminilidades a bordo: Projeto(s) de gênero na carreira de comissárias e comissários de voo

Masculinidades y feminidades en el cielo: Proyecto(s) de género de la carrera de los/las auxiliares de vuelo

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ABSTRACT

This article resumes the interactionist bases of career studies to analyze the construction of gender project(s) regarding masculinities and femininities in the careers of flight attendants. We used a qualitative-oriented research methodology divided into five main stages: documentary and bibliographical research; 16 months of general immersion with field observation and journaling; specific immersion with field observation (participating in a flight attendants' training course); collection of 23 professionals' biographies; and construction and analysis of thematic narratives. The information was analyzed based on the perspective of collective narratives in three relational moments: training, joining an airline, and work routine. The discussions point to the necessity of constructing career projects as gender projects and the potential for personal metamorphosis by emphasizing and embodying masculinities and femininities, as well as trajectories negotiations in the field of possibilities – temporal, dynamic, and contextual dimensions. The research findings broaden the debate on gendered careers and bring an original methodological and theoretical contribution to collective careers.

Keywords: career, gender, masculinities, femininities, symbolic interactionism.

RESUMO

Este artigo retoma as bases interacionistas dos estudos de carreira com o objetivo de analisar a construção de projeto(s) de gênero, com referência a masculinidades e feminilidades, na carreira de comissárias(os) de voo. O percurso metodológico, de orientação qualitativa, ocorreu em cinco etapas principais: pesquisa bibliográfica e documental; imersão geral por 16 meses de observação do campo e registro de diários; imersão específica no campo com a participação em curso de formação para comissárias(os); coleta de biografias de 23 profissionais; e construção e análise temática de narrativas. O conjunto de informações foi analisado por narrativas coletivas em três momentos relacionais: formação, ingresso na companhia aérea e cotidiano da carreira. As discussões apontam para a construção do projeto de carreira como um projeto de gênero; o potencial de metamorfose individual ao enfatizar e corporificar masculinidades e feminilidades e as negociações das trajetórias no campo de possibilidades, dimensão temporal, dinâmica e contextual. As conclusões da pesquisa ampliam o debate de carreiras generificadas e trazem uma contribuição metodológica e teórica original para carreiras de coletividades.

Palavras-chave: *carreira, gênero, masculinidades, feminilidades, interacionismo simbólico.*

RESUMEN

Este artículo retoma las bases interaccionistas de los estudios de carrera con el objetivo de analizar la construcción de proyecto(s) de género, con referencia a masculinidades y feminidades, en la carrera de los/las auxiliares de vuelo. El diseño metodológico, con enfoque cualitativo, se desarrolló en cinco etapas principales: investigación bibliográfica y documental; inmersión general durante 16 meses de observación de campo y registro de diario; inmersión específica en el campo con participación en un curso de formación para auxiliares de vuelo; recopilación de biografías de 23 profesionales; y construcción y análisis temático de narrativas. El conjunto de informaciones fue analizado por narrativas colectivas en tres momentos relacionales: formación, ingreso en la aerolínea y día a día de la carrera. Las discusiones apuntan a la construcción del proyecto de carrera como un proyecto de género; el potencial de la metamorfosis individual al enfatizar y corporificar masculinidades y feminidades y las negociaciones de las trayectorias en el campo de posibilidades, dimensiones temporal, dinámica y contextual. Las conclusiones de la investigación amplían el debate de carreras generizadas y aportan una contribución metodológica y teórica original a las carreras de colectividades.

Palabras clave*: carrera, género, masculinidades, feminidades, interaccionismo simbólico.*

INTRODUCTION

The concept of career allows analyzing the dynamic relationship between people, organizations, and contexts (DeLuca, Rocha-de-Oliveira, & Chiesa, 2016; Gunz & Mayrhofer, 2018; Hughes, 1937). However, the interactions established between contextual elements, collective actions, and individual career paths are still little explored (Gunz, Mayrhofer, & Tolbert, 2011; Mayrhofer, Meyer, & Steyrer, 2007), even though these interactions are sources of significant tension between the characterization of professional types and the universal values – as observed in studies that address careers without appropriation of theoretical-scientific knowledge (Grangeiro, Barreto, & Silva, 2018). In this study, we consider that "careers are the product of social structures such as organizations or institutions and, in turn, produce and reproduce these structures" (Gunz et al., 2011, p. 1616).

The main career theories adopt gender neutrality (Fraga, Gemelli & Rocha-de-Oliveira, 2019; Mayrhofer et al., 2007) and the discussion on the influences of social structures in the context of work is still limited in the field of organizational studies. The limitation on discussing gender and social structures stems from both the dichotomy between male and female and the absence of cultural, social, economic, and political elements involved in the construction of careers and gender (Fraga & Rocha-de-Oliveira, 2020). The dominant understanding in Brazil is that research on women or studies comparing men and women are gender studies (Ceribeli & Silva, 2017; Hryniewicz & Vianna, 2018; Moreira & Silva, 2018; Pagnussatto & Lucas, 2017; Santos, Lima, Paiva, Marques, & Guimarães, 2021; Vieira, Monteiro, Carrieri, Guerra, & Brant, 2019).

Although the discussion about kaleidoscopic careers and the opt-out movement (Mainiero & Gibson, 2018; Mainiero & Sullivan, 2005) highlights women's career paths, the international scenario adopts an understanding based on the difference between the female and male realms. When focusing on a specific and privileged group, these perspectives analyze the choice patterns that redirect (like a kaleidoscope) the careers of women in search of authenticity, balance, and challenge and the opt-out of highly qualified women from corporate careers, mainly due to the incompatibility with motherhood (Mainiero & Sullivan, 2005). In addition to universalizing women as a homogeneous group, this reinforces the idea that gender is equivalent to sex. Thus, male or female characteristics are acquired biologically, neglecting the sociocultural influences of the contexts (Fraga & Rocha-de-Oliveira, 2020; Mayrhofer et al., 2007).

This article assumes that gender builds social relationships and establishes power asymmetries between groups based on differences regarding sex (Connell & Pearse, 2015). The inclusion of masculinity and femininity (Connell, 2018) in this discussion provides an opportunity to advance the theory and corroborates the multiplicity of gender experiences. Thus, we recognize the need to adopt interdisciplinary theoretical bases in career studies (Arthur, 2008; Maanen, 2015; Parker, Khapova, & Arthur, 2009), and we use the symbolic interactionism (Barley, 1989; Mendonça, 2002) to propose a dialogue between such studies and gender. We observe that, as in the constitution of a profession (Barros, Cappelle, & Guerra, 2021; Barros, Cappelle, Souza, & Lobato, 2018; DeLuca

& Rocha-de-Oliveira, 2016; DeLuca et al., 2016; Hughes, 1937, 1958), gender is an individual and collective construction in socio-historical contexts.

A career is considered an individual and collective path built and modified over time through negotiating projects and within a specific field of possibilities (DeLuca et al., 2016). Thus, three elements stand out: time as a dimension that marks the career paths; dynamism in which people, groups, and organizations negotiate the construction of careers; and the expansion of the idea of a collective career (DeLuca et al., 2016). With these premises, we launch the theoretical basis to understand how the development of occupations occur, through internal and external negotiations, incorporating, adding, and modifying individual or group projects defined by social markers of difference, such as gender.

The theoretical-methodological approach proposed in this study considers that careers are lenses to glimpse collective social processes that occur in traditional and deviant professions. The field of aviation was chosen, with a traditional, normative, and masculine background and, specifically, the cabin crew career, initially reserved for a specific group of women, with diversion constructions. This context presents possibilities to think about gender as a central structure and a marker that crosses all the processes of professional construction.

The socially constructed feminine essence within the profession and the unusual mobility for women, especially in the 1920s when the profession emerged (Barry, 2007; Duffy, Hancock, & Tyler, 2017; Sangster & Smith, 2016; Tiemeyer, 2013; Whitelegg, 2007), activated a recursive process of memory relevant to career studies (DeLuca et al., 2016). The caring instinct and the aptitude for domestic activities, characteristics considered natural for women, represented what was expected from the service on the aircraft: "they got to fly, but in the process, airlines claimed proprietorship over their bodies and began to market their femininity" (Whitelegg, 2007, p. 35). This feminized place also provided an occupational refuge for gay men (Tiemeyer, 2013).

Based on the theoretical framework of Raewyn Connell (1987, 2016, 2018), it is considered that professional practice built in gendered spaces (Fraga & Rocha-de-Oliveira, 2020), such as aviation (Barry, 2007; Castellitti, 2019, 2020; Silva, Uziel, & Rotenberg, 2014; Tiemeyer, 2013; Whitelegg, 2007), is marked by the (re)production of masculinities and femininities that translate into gender projects (Connell; 2018; Schippers, 2007). This article resumes the interactionist bases of career studies to analyze the construction of gender project(s), concerning masculinities and femininities, in the career of flight attendants.

THE INTERACTIONIST CAREER CONSTRUCTION

Career theory has its own career (DeLuca et al., 2016), sometimes focused on individual paths, sometimes on paths in organizations (Bendassolli, 2009; Gunz & Mayrhofer, 2018). The first studies emerged in the field of sociology, in the North American context, especially from the work of Everett Hughes (1937, 1958), who highlighted the objective and subjective dimensions of a trajectory and the dynamic relationship between individual and context.

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In the 1970s, research focused on understanding organizational careers (Hall, 1996, Maanen, 1978; Schein, 1978) and the particularity of intra-organizational mobility. From the 1990s, the individual perspective became central; the studies pointed to agency capacity and suggested less interest in organizational careers. In this scenario, Arthur's (1994) boundaryless career models and Hall's (1996) Protean career stand out, both of which have dominated the discussion in the field for more than a decade.

In the early 2000s, the number of studies indicating the need to resume an interdisciplinary analysis grew (Arthur, 2008; Maanen, 2015; Parker et al., 2009), and proposals emerged based on classic research, which considered the individual, organizational, and contextual dimensions in career development. Among the proposals in the Brazilian context, the neo-interactionist proposal presented by DeLuca et al. (2016) stood out. Internationally, it is worth highlighting the social chronology framework by Gunz and Mayrhofer (2018) and the sustainable careers model by Vos, Heijden, and Akkermans (2020).

Symbolic interactionism emerged in the Chicago School and has coined an influential position from a methodological and conceptual point of view. Between the 1920s and 1960s, the interactionist orientation proposed the study of paths and behaviors of individuals and collectives differently from the functionalist sociology adopted at that time (Barley, 1989; Mendonça, 2002). Herbert Blumer (creator of the concept and premises of interactionism), Everett Hughes (the first author to conceptualize career), and Howard Becker (a pioneer in the studies of deviant careers) are its best-known representatives. They contributed to understanding society as a process of interaction between people, their interpretations of the events they experience, and the actions derived from these interpretations. Continuously and dynamically, the senses are signified and (re)signified in time and space, as people and groups reciprocally see and experience reality. The interactionist approach brought the understanding of the profession as a form of socialization that accompanies the career, based on Hughes (1937). In this theoretical perspective, all people have careers. There are no breaks between jobs, trades, and professions. There is no possibility of analyzing careers by separating people and organizations (Hughes, 2003; Maanen, 2015).

The potential of the approach to management (Mendonça, 2002) has recently been explored in studies on non-traditional or deviant careers (Barros et al., 2018, 2021; DeLuca & Rocha-de-Oliveira, 2016). The proposal by DeLuca et al. (2016) aligned the interactionist approach with the concepts of the anthropologist Gilberto Velho for the analysis of complex societies, allowing a detachment from the dichotomous forms individual/organization, objective/subjective, man/woman – which intensify, legitimize and naturalize differences experienced in trajectories. Therefore, a career is, at the same time, "a retrospective and projected path, dynamic and changeable, of an individual or collectivity, revealing negotiations between objectivities and subjectivities" (DeLuca et al., 2016, p. 472). It should be noted that the concept adopts a relational and reflexive conception between people and contexts (Gunz et al., 2011; Mayrhofer et al., 2007) when understanding individual and collective careers as representative of the relationships circumscribed in a socio-historical time, as is also advocated in the social chronology framework (Gunz & Mayrhofer, 2018).

The concept considers the path simultaneously situated in the past, present, and future. The path is constituted amidst negotiation of individual and collective projects and metamorphoses. For Hughes (1937, 1958), it integrates the career's objective (status and positions) and subjective aspects (interpretations through individual and collective interactions), which can be experienced in a plural way due to gender. Dilemmas and conflicts (Hughes, 1937) resulting from objective and subjective interactions during a lifetime are influenced by historically constructed social roles and characteristics expected for certain professional positions.

The definition also explores the notions of project, metamorphosis, field of possibilities, and negotiation of reality (Velho, 2003). The projects represent objective behavior directed to reach goals that are also objective. At an individual level, they are related to "acts, explorations, performance, and options, anchored to assessments and definitions of reality" (Velho, 2003, p. 27). Projects are mutually influential throughout career building and can be individual or collective (DeLuca et al., 2016). It is important to say that collective projects are not homogeneous, as there is room for interpretations according to status, trajectory, generation, and gender, to name a few. Metamorphosis is the process of interaction and change experienced by people when transiting through different spheres of life (Velho, 2003). The field of possibilities represents the set of alternatives that manifests from the lived socio-historical context at the individual level. When faced with social organization, experienced through interactions, exchanges, and conflicts, people and groups negotiate differences and similarities through different symbolic meanings, sometimes unconsciously. This dynamic process is called reality negotiation (Velho, 2003).

Based on the concepts of project, field of possibilities, negotiation of reality, and metamorphosis, an integrative (individual-organizations-social context) and dynamic construction is possible. Each person can change and adjust their projects, accommodating other personal or collective projects, using the potential for metamorphosis. Therefore, it is possible to say that, in any means of socialization, gender specificities and other social markers are produced and are producers of negotiated symbolic interactions and influence both individual and collective projects and the field of possibilities available.

GENDER PRODUCTION AND REPRODUCTION: PROJECTED MASCULINITIES AND FEMININITIES AND CAREER RETROSPECTIVES

Like career studies, the concept of gender also has a path, or, one could say, "gender has gender." The term is often used without theoretical discussion, as a fixed variable related to sex, or as a synonym for research on women and the feminine, especially in the field of administration (Fraga et al., 2019). The historical and contextual emergence of gender studies, the concept's origins and definitions, and the main feminist theoretical approaches took shape in the 1960s. In addition to the issue of women, gender brings with it a questioning of patterns of masculinity

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defined in society since standardization, in general, reflects opposition to a model (Connell & Messerschmidt, 2013).

Gender can be understood as a central structure of social life that produces and reproduces roles, identities, discursive formations, and classifications of bodies (Connell, 2016). Such considerations are aligned with the understanding of gender beyond a unitary variable – a theoretical, methodological, and political perspective. The gender approach challenges career studies to look at the social and institutional structures that (re)produce normative patterns (Mayrhofer et al., 2007). Such patterns are primarily characterized by inequality between men and women and involve other elements of gender construction.

The concept of hegemonic masculinity is understood "as the pattern of practices (i.e., things done, not just a set of role expectations or an identity) that allowed men's dominance over women to continue" (Connell & Messerschmidt, 2013, p. 245), presents new dynamics in gender relations, alerting to relations of power, dominance, and social hierarchy, which are not restricted to man-woman binarism. Hegemonic masculinity is aligned with a specific type of femininity – emphasized femininity – which is "defined around compliance with this subordination [to men] and is oriented to accommodating the interests and desires of men" (Connell, 1987, p. 184). The approach proposed by Connell (1987) to understand gender hegemony also encompasses the asymmetries of relations between men. In addition to an emphasized femininity, subordinate masculinities (such as that of gay men) make up the gender order in the social landscape.

Revisiting the concept, Connell and Messerschmidt (2013) reflected on other critical points for research, such as the agency of subordinate masculinities. They discuss protest masculinities (from marginalized ethnic groups), gay masculinities, and the appropriation of hegemonic masculinity characteristics by elite women when building executive careers (Connell & Messerschmidt, 2013). Furthermore, they warned, "women are central in many of the processes constructing masculinities – as mothers, as schoolmates, as girlfriends, sexual partners and wives; as workers in the gender division of labor" (Connell & Messerschmidt, 2013, p. 266).

Efforts to advance Connell's theory have been made by other researchers (Duncanson, 2015; Ferree, 2018; Messerschimidt, Martin, & Messner, 2018; Schippers, 2007). Schippers (2007) proposed deepening the study of femininities, and the joint analysis of masculinities and femininities as gender projects (Connell, 2018; Schippers, 2007):

> Masculinities and femininities can become "gender projects" in the lives of individuals, but they do not refer to features of or specific kinds of people. Instead of possessing or having masculinity, individuals move through and produce masculinity by engaging in masculine practices. In this way, masculinity is an identifiable set of practices that occur across space and over time and are taken up and enacted collectively by groups, communities, and societies (Schippers, 2007, p. 86).

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Such gender projects can take different formats in each professional field. However, they always operate in relation to structures – to the gender order of society and institutional gender regimes (Messerschimidt et al., 2018) – insofar as men and women produce and hierarchize social relations based on gender. Duncanson (2015) considers that the challenge of balancing gender relations is in hegemonic masculinity maintaining its superior position through the feminization of other groups of men while reinforcing the understanding of femininities as hierarchically inferior.

It is considered that gendered professional fields, those constituted by a majority of men or women, present barriers for people who do not contemplate the expected gender project. Simpson (2005) carried out research with male nurses, flight attendants, librarians, and primary school teachers to understand how insertion and professional guidance occur and the possible existence of consequences attributed to the stereotype of working in a non-traditional occupation for men. The results showed that these professionals require presuppositions of femininity, such as sensitivity, beauty, and care.

Military careers are prominently traditional male fields of work. Häyrén (2016), in an ethnographic study of the fire department, highlights the interactions between contexts and people in the construction of masculinities and the gendering of all organizational processes. In research carried out with military men and women, Hale (2008) found the protected version of standard masculinity established in the British military organization. Interviewees emphasized that they "they do what they do and they are who they are simply because that is their job" (Hale, 2008, p. 327). Therefore, it is noted that masculinities and femininities are exacerbated and require objective and subjective practices of gender in the profession.

Civil aviation emerged in the military environment and is a workspace with particularities for studying gendered careers. The social-historical imaginary refers to a combination of impeccable safety and flight service, directly related to the professionalism of pilots and flight attendants. Although cabin crew work has been around since the 1920s, recognition of the profession began in the 1930s, when American Airlines began hiring female nurses as flight attendants and invested heavily in a standard of femininity that would attract passengers (Barry, 2007; Whitelegg, 2007). The best-known study on the career of flight attendants is the book by Hochschild (2003), originally published in 1983, which addresses the sociology of emotions inherent in the career (Santin & Kelly, 2017).

In the construction of careers in different professional fields, it is noted that masculinities and femininities are exacerbated and require objective and subjective practices of gender. Gender projects include the specificities of the gender social order, combined with masculinities and femininities, which influence individual and collective career projects, and the field of available possibilities.

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METHODOLOGY

Following the path suggested by Connell and Messerschmidt (2013), this study analyzes the interactive construction of masculinities and femininities that occur at the local level – where face-to-face interactions occur, in immediate communities, for example – following symbolic interactionism as a methodological path (Mendonça, 2002). Data collection included participant observation in the course required by the National Civil Aviation Agency (ANAC, 2005) to be a cabin crew member and analysis of flight attendants' biographies (Riessman, 2013) at different times in their careers. All experiences during 16 months of immersion in the field, and seven months in which one of the researchers participated in the course, were recorded in field diaries, as indicated in ethnographic research (DeLuca & Rocha-de-Oliveira, 2016; Maanen, 2015). A writing notebook was used to record the researcher's observations during classes and events since the use of any electronic device is prohibited in aviation schools. The method is relevant to interactionist research (DeLuca & Rocha-de-Oliveira, 2016) and is commonly used in those related to gender discussion (Castelitti, 2020; Hirshfield, 2015). Exhibit 1 summarizes the five main methodological stages of the research.

Exhibit 1. Research methodological steps

Stages (32 months)	Activities
Bibliographic and documental research (From February 2017 to October 2019)	- Reading about the history of the flight attendant profession; - Analysis of legislation applied to aeronauts and requirements to work in Brazil and abroad; - Elaboration of the research's theoretical framework.
Immersion in the field (general) (From May 2017 to September 2018)	- Contact aviation schools; - Approaching and becoming a member of groups on social media, webpages, and online channels about aviation and the aeronaut career; - Participation in a flight safety training course and lectures on the aeronaut career in Brazil and abroad at aviation schools; - Observation of social media accounts specialized in promoting the career and aimed at aspiring professionals; - Recording each experience in field diaries.
Immersion in the field (specific) (From August 2017 to March 2018)	- One of the researchers concluded the Theoretical and Practical Instruction Program (flight attendant training course); - Participation in a regular class, including survival (jungle) and water survival, first aid, fire fighting, and seamanship; - Registration in field diaries during and after theoretical and practical lessons.
Collection of biographies (From May/2017 to April 2019)	- Search for potential participants, through publications using a personal account on social media, in groups on social media, recommendations from aviation schools, and personal contacts; - Online or in-person collection of biographies, according to the availability of each participant; - Registration of the interactions after the interviews.

continue

Exhibit 1. Research methodological steps

concludes

Stages (32 months)	Activities
Narrative construction and thematic analysis (From June 2017 to October 2019)	- Transcription and prior analysis of individual biographies; - Theorization considering the theoretical framework. The activity emphasized how the stories were told (time), the productions and practices of masculinities and femininities as gender projects, the past-present-future dimensions of the career; - Identification of the main moments of individual negotiation within the field of possibilities; - Identification of the gender project as a local and collectively constructed career project; - Construction of the synthesis of the collective career and theoretical-empirical discussion.

A total of 50 people were contacted to collect biographies, and 23 flight attendants were interviewed. They work (or have worked) in national and international airline companies with varying ages and career times. The interviews were based on the provocation "tell me your story" (Connell, 2018), and participants spoke freely with as little interruption as possible. A second interview was carried out with six participants, and a third was conducted with one person, given the representativeness of their stories for the set of biographies. In all, 30 interviews were conducted, all recorded with consent and authorization. The interviews lasted between 60 and 240 minutes each, with an average time of 120 minutes, and were fully transcribed for analysis. In addition, the same notebook as the field diaries was used for notes after the interviews.

Neutral names (which could be either male or female) were used to identify the participants. The use of neutral names prevented any unintentionally masculine or feminine characteristics from being anticipated by the reader and made it possible to show that both men and women build career projects as gender projects. Of the 23 flight attendants interviewed, 15 were female and 8 were male. Table 1 identifies each participant, their level of education/training, approximate time of experience as a cabin crew member, age at entry into the first airline, and age at the time of the interview.

Table 1. Identification of participants

Name	Education	Flight time (years)	Age (when started)	Age (Current)
Alex*	Degree in pedagogy	20	42	63
Taylor*	Degree in law	20	21	52
Francis	Acting school	20	21	44
Dominique	Degree in international relations	15	18	35
Mica	Degree and technical education in nursing	12	27	39
Tainã	Acting school	12	21	33

continue

Table 1. Identification of participants

concludes

Name	Education	Flight time (years)	Age (when started)	Age (Current)
Angel	Degree in psychology	12	28	40
Muriel	Undergraduate student of pedagogy	11	19	31
Charlie*	Unfinished degree in language (English)	9	23	32
Dylan	Degree in Aeronautical sciences; private and commercial pilot; unfinished degree in business administration	9	22	31
Billy	Unfinished degree in gastronomy	9	28	36
Chris	Unfinished degree in tourism	8	22	31
Kelly*	Degree in public relations	8	25	33
Ariel	High school	8	22	30
Kim	Degree in physical education	7	25	33
Paris	Degree in fashion; private and commercial pilot	7	21	28
Sidney	High school	6	20	26
Alison	Studied gastronomy; student in a course to prepare technicians for events; unfinished degree in physiotherapy; unfinished degree in business management	5	31	36
Rene**	Degree and Post degree in Environmental Management; unfinished degree in chemistry	5	25	34
Gil**	Degree in law; unfinished degree in physiotherapy	5	24	33
Sam**	Unfinished degree in nursing; unfinished degree in cosmetics	5	29	38
Andrea	Undergraduate student of psychology; unfinished degrees in business administration, international relations, and hospitality	5	19	27
Sasha	Private and commercial pilot	2,5	21	23

Key:
*hired by international companies. These professionals were not trained in Brazil.
**former flight attendants. At the moment of the interview, they had left the industry for more than five years

The interactionist perspective was adopted in data collection, transcription, and analysis. According to this perspective, a career path includes a life story. The proposed biographical analysis assumes a historical and original perspective, which mobilizes memory and projects in the relationships between past, present, and future, as narrated by the participants (DeLuca et al., 2016). Biographies were collected and analyzed as thematic narratives (Riessman, 2005). Following Connell's (2016, 2018) methodological perspective, the stories are theorized with the theoretical contribution of gender, and there is an effort to understand each one prior to a collective synthesis. Thus, a collective narrative was elaborated, describing and analyzing how gender projects are constructed and constantly reaffirmed throughout the flight attendants' careers.

GENDERED CAREERS: GENDER PROJECTS OF FLIGHT ATTENDANTS

We chose to present a collective narrative as a thread that tells the story of the participants and is built in three moments: it starts with the training course, followed by joining the airline, and finally, the working routine in the flight attendant career. The narrative follows the notions of time, dynamism, and collectivity (DeLuca et al., 2016), and meets the reports and the interaction with the field, considering the temporal dimensions and the striking negotiations in the trajectories.

The training course: how flight attendants are prepared

In the first class, the instructor announces, "you either fit in, or you are out." The more you "fit the mold," a term frequently used in the course, the greater the chance of an airline hiring you. Fitting the mold has to do with how to dress, behave, communicate, and interact and is something strongly required during the course. Students even comment that they are mistaken for qualified flight attendants when they are on public transport on the way to school. At the beginning of the activities, a leader is chosen for the group, equivalent to the senior crew member in civil aviation. This person is responsible for making the extra-class study materials available, calling for the return to the room after break times, demanding proper posture in classes and the course facilities, monitoring the organization of the space at the end of each day, and resolving private or group issues with the instructors.

Uniform is mandatory and must always be perfect: suit, shirt, dress shoes, and tie for men; and standard dress, blazer, tights, and shoes for women. Women are required to paint their nails in red, light tones, or brownish tones. Makeup must be immaculate and striking, with the use of red lipstick. Hair must be tied at ear height; if tied in a ponytail, the maximum length is to the middle of the back. Short or medium cuts can be used, as long as they do not go beyond shoulder length. Men must have short hair, a clean beard, and hands without bitten nails. The entire organization of the course structure is based on the binary male or female, masculine or feminine. Control at all stages of each institutional process and the daily individual and collective reproduction of the gender order are a hallmark of the relational dimension between gendered agency and structure (Häyrén, 2016; Messerschimidt et al., 2018).

There is an intense adjustment process (fit the mold) for the future occupation, which is constantly crossed by gender. There is no reference in the ANAC manual (2005) on the distinction by sex in fulfilling the course hours. However, without explanation from the school or contestation from students, many movements trained to be performed in the hiring processes or when carrying out the working routine are distinctly normalized for men and women. Male and female flight attendants are taught differently how to take off and put on shoes and coats, sit and stand up, pick up objects on the floor, and appropriate positions for the arms or legs to stand or sit. Classes in personal marketing and good manners, interpersonal relationships, and professional etiquette are part of the content learned.

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For women, the content also includes makeup classes: hygiene, tonic, hydration, concealer, foundation, face powder, eyebrow definition, shadows, eyeliner, eyelash mask, pencil, lip contour, lipstick, blush, illuminating powder, and makeup fixer. "Going to work without make-up looks like you could not finish getting ready," says the only female instructor on the course. "Make-up is natural for women," says one instructor. "I want you to be perfect," points out another.

An imaginary world, or as Sidney says, "a fairy tale," is built for the classes. When they start classes, students receive badges and wear uniforms that imitate airlines'. The badges display the word in Portuguese, "*comissário*" regardless of whether male or female students (in Portuguese, female flight attendant is *comissári<u>a</u>* and the male flight attendant is *comissári<u>o</u>*). It is part of the "10 commandments" to present themselves at school as if they were professionals and not students on a course – going to class is going to work. "It's like you're going to work," says Sidney. Although the training is for commercial aviation, the origins are military and constantly show – everything is traditional and normative. There is a reinforcement of the gendered appearance, emphasizing the mandatory use of makeup, earrings, and painted nails for women.

During the course, sexuality is a topic emphasized for women, and heterosexuality is considered the norm (homosexuality is a subject little addressed). "Everything in a woman revolves around reproduction [...] and a man is a reproducing machine, a ram covers eight to ten sheep. If our society were like animals, it would keep only the best reproducers" (Excerpt from the field diary, transcribing the speech of a male instructor who was in the military reserve, December 2017).

> The [male] instructor started quoting Freud in class, talking about the theory that a woman is only fulfilled when she has a son. So far, I have not heard any homophobic comments, but they are sexist all the time [...] later, the same instructor talks about gay activism in aviation, says that companies have always been ahead of their time thanks to international flights. 'Most male flight attendants are gay' (Excerpt from field diary, November 2017).

Although women are the majority in the classes, sexist speeches and stereotypes about gender roles are part of the instructors' repertoire – even if none of the subjects have any relation to sex or gender. "That will never change: a woman has a micro-analysis to protect the nest. Man has the capacity for macro-vision, he provides and protects, it is the man who hunts and provides security" (Excerpt from the field diary, transcription of a speech from a male instructor who is a flight attendant, November 2017). This also includes the idea of occupational hierarchies related to the professional image with stereotypes of gender, sexuality, and class status that have accompanied the profession since the beginning (Castellitti, 2019, 2020; Duffy et al., 2017; Sangster & Smith, 2016; Tiemeyer, 2013):

> [Student] Would you recommend that your son be a flight attendant?
>
> [Instructor in silence... Thinks for a moment] No, to be a pilot.
>
> [Student] But why? - showing surprise.

> [Instructor] It's like asking if I want my child to be a nurse or a doctor. Doctor. Gastronomy or Law? Law. For me, it was worth it because I was from a very poor background, he is an only child, I can afford the pilot training (Excerpt from field diary, speech by a male instructor, former flight attendant, December 2017).

According to Good and Cooper (2016), dealing with sexual harassment is common in service professions. For Hochshild (2003) and Santin and Kelly (2017), addressing this issue is part of these professionals' emotional labor, which is particularly required from female flight attendants. Hochshild (2003) conducted pioneering research showing that the flight attendants' emotions are a product considered together with in-flight service. The recommendation in harassing situations is to remain "politically correct," to "suck it up," and "toughen" the facial expression since "it is part of your service to be friendly" (Good & Cooper, 2016).

The first manifestation of a student against this naturalized attitude in the relationship with passengers, narrated as natural by instructors, happened when she was already halfway through the course: the student said that neither she nor any woman would like to be harassed while working. Among comments about "compliments, catcalls, and invitations" received by flight attendants during flights, the instructor commented on a flight attendant who "has done well" by marrying a businessman and told stories of flight attendants who had "a second job" [prostitution]. The following dialogues summarize these moments:

> [Instructor] Female flight attendants get many catcalls... you're going to leave the flight with lots of phone numbers!
>
> [Student] Some catcalls are very vulgar; I would not like to hear that when I'm working.
>
> [Instructor] Yes, it's true. But there are good ones. If you are a female flight attendant, you only stay single if you want to! [...] And there are flight attendants who have a second "job," they earn between fifteen and twenty thousand reais a month. I have an alumnus who earns three grand per session.
>
> Silence. The explanation of the matter continues, and no one comments. (Excerpt from the field diary, February 2018)

It is observed that objective and subjective negotiations (DeLuca et al., 2016; Hughes, 1937) reflect in the bodies and attitudes of those who aspire to be flight attendants, people, usually young people, coming from the countryside, who adjust their individual projects to the collective project established for the career. This mold – built initially in the training courses and (re) built continuously in training activities offered by the airline companies – is required by the potential for individual metamorphosis (Velho, 2003) and reinforced by the field of possibilities experienced collectively.

Due to military heritage, marked by strict norms and rules, the field of civil aviation brings together some of the most regulated careers in the world (Instituto Brasileiro de Aviação, 2018).

Everything – the standards, the conduct, the posture – is justified by the need for security. At the same time that it fits students into a standard considered expected by the companies, the course serves as a kind of guarantee for approval in future selection processes. Training to be a flight attendant is the initial construction of gender projects in the career.

The production for the future career (lived as the present) is guided by the image of projects fitting a mold, with the constant reaffirmation of behaviors needed to enter and remain in the career. The idea of suitability for work in advance includes or excludes following culturally agreed rules, values, and conduct, similarly to what Häyrén (2016) observed in the research with the fire department. Because the number of professionals is much higher than the demand from companies, receiving the school's recommendation for a vacancy in selective processes is a facilitator.

The entrance to the airline (fitting the mold)

Those who are not trained as required in Brazil also have to fit the mold. Kelly tells about the training offered by the airline company, half dedicated to technical knowledge and the other half focused on physical appearance and posture, with great rigor in terms of professional image.

> [...] this initial training is to mold and keep consistency, so everybody is at the same level. I like to say it is "McDonald's style," you know? Every time you go to McDonald's, you know what you expect, you know how the service works, what types of food there is, and such; the training is more or less the same principle [...] (Kelly)

Direct hiring to foreign companies, as in the case of Alex, Taylor, Charlie, and Kelly highlighted the significant difference between those who took the course and those who did not, even though it was not required. "[...] The girls were even dressed as flight attendants, some girls worked in Brazilian airlines, so they were perfect, and I was dressed to go to the office, so to speak. Because I had no idea what it was like" (Charlie). The justification regarding the image that must be produced is given by the indication of greater mobility of the (thin) body and the safety that this represents in risky situations, although the appearance is linked to aspects of beauty at all times.

> Another thing that I think counts a lot at the time of selection – today this policy is no longer so strong, but... – [the person] is blonde, tall, thin, [the person] speaks well, you know? Whether you like it or not, these physical aspects count a lot for working on the plane. It is important to be agile and tall to get things inside the plane, it's kind of a little lego game; it's all fitted together. (Muriel)

Although female flight attendants end up following the norm regarding the issue of appearance (because of tradition or because of a professional obligation), this requirement is

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something that women especially dislike – since "in men there is not much to change" (Mica) – which can be understood as metamorphosis potential (DeLuca et al., 2016) established in different ways and based on gender difference.

> Girls especially, men do not, because there's not much to change in men, right? [...] for women, I still always think that lipstick, basic makeup, is... I think it's a differential; people feel good. Today, people do not care anymore. Regarding weight, we see, you see people who are quite fat on flights today, so, I don't know, so the criteria have changed a lot [...] (Mica)

Regarding the metamorphoses and objective and subjective negotiations required during work activities, which mobilize the retrospective (gender) experience, depending on the future (gender) project, Tainã tells about a female colleague the interviewee met before becoming a flight attendant, reporting the change that occurred when starting the job.

> [...] she refused to wear a skirt to work, she didn't work in a skirt, she looked and said: "I hate skirts, I only wear a skirt if I have to, if my pants rip" [...] she didn't want to wear makeup and the company required it [...] So, you see, the boys who would like to wear makeup, sometimes, on the flight, couldn't. And the girls who didn't want to were forced to (Tainã).

Despite the reinforcement of stereotypes in the standards observed for female flight attendants, emphasizing "feminine" qualities protected the profession and enabled unopposed growth from men (Barry, 2007; Whitelegg, 2007). Emphasized femininity and the notions of care, empathy, and other virtues considered feminine, are central to understanding gender power relations (Connell & Messerschimidt, 2013; Messerschimidt et al., 2018). In addition to the compulsoriness of makeup, the career – and its corresponding image – was built by white women, who should be and remain single, middle class, aged between 21 and 27, retirement scheduled at a maximum of 35 years, and pre-established weight and height (Tiemeyer, 2013; Whitelegg, 2007). It is worth mentioning that, until a few years ago, companies used the weight and height procedure in the selection processes, which was commented on in the course as a possibility of happening and, by the interviewees, as something common for those who are in the career for more than five years.

Although it represents the idea of nomadic life, due to the immediate mobility nature, in time and space of the profession, the intention of following an international career or flying abroad with national companies is not a common objective. Considering that the flights are longer and more exhausting, the students believe that it does not compensate for what they would earn. In addition to the possibility of traveling and discovering new places, the salary, which ranges from BRL 5,000.00 to BRL 7,000.00 (Instituto Brasileiro de Aviação, 2018), is considered one of the main attractions, especially for someone young who would not earn the same as a beginner in another career. Possible social mobility and the status associated with traveling

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contribute to the normalizing effect of occupation. Young people from inland cities seeking entry into an occupation with signs of rapid return naturally accept the impositions required for the activity. Also, unlike the wage inequality between women and men, which is common in almost all careers in Brazil (Fraga & Rocha-de-Oliveira, 2020), for flight attendants, this does not happen, given that the salary is standardized.

The interviewees' profile corroborates the survey by the Instituto Brasileiro de Aviação (2018). The majority of professionals completed higher education and were aged between 25 and 34 years old. These professionals remain in the career for more than five years (the average length is seven years). The interviewees' responses reflected two main reasons for leaving the job: instability in aviation, which motivates the construction of other career options, and the harmful effects of pressurization on the body. The number of undergraduate courses started and not completed is noteworthy, justified by the difficulty of reconciling routine schedules with their shifting professional schedules.

The (gendered) working routine

Almost all narratives contain aspects directly or indirectly related to gender and image-imaginary and, consequently, to masculinities, femininities, elements that structure the career of flight attendants, even though, sometimes, they do not perceive or regard as something of the order of common knowledge. Thus, contradictions arise in the narratives, such as the perception of an equal number of men and women in the career, the indirect preference for one sex in hiring or cases of harassment and gender discrimination, and the hierarchical relationship between flight attendants and pilots.

The relationship with the pilots also has certain customs: "usually they give us a hand to get in the van, a courtesy, which, for me, honestly, makes no difference, but, you know, that folklore..." (Alison). Other rules, in the same sense, used to be followed in the career:

> [...] when I joined, there was one position that one flight attendant held, assistant three, who is up-front with the boss, they always had to be a woman, always, it couldn't be a man, no matter if it was the oldest woman on the flight, she had to be there in front of the boss's side [...] (Ariel)

The hierarchy of the profession and between professions, built with segregation by sex and masculinity ideals (Connell, 2016, 2018; Häyrén, 2016), is a common report. Dominique says that pilots represent the highest authority and, protected by the position of power, they intimidate gay men in a homophobic way and women in a harassing way, who feel scared to report to the company despite the code of ethics being strict. The concept of hegemonic masculinity, in this sense, is observed in the relational perspective when it ranks non-hegemonic forms of masculinity (Messerschimidt & et al. 2018), as in the case of homosexual men. Alison reflected on the way these power dynamics go beyond the professional space when reporting that "in this

relationship, in which we work a lot with hierarchy, from the moment you get in the van to the airport, it is a very heavy hierarchy, and they take advantage of it sometimes. It is often abusive."

The statements collected during the interviews addressing the current context are in line with what Alex reveals about why their family did not support them in working in aviation, in the mid-1980s, due to the negative and eroticized view of the relationship between flight attendants and pilots (Duffy et al., 2017). Alex also talks about the similarity between the profession and the hierarchy and the eroticization of the professional relationship between doctors and nurses: "it is not only this profession, the same thing happens with doctors, nurses, at that time, in Brazil, it was also said that there was a danger that women were with doctors." The report corroborates Barry (2007) and Whitelegg (2007), who, when narrating the history of the profession, relate the proximity of the hospital dynamics to that of aviation since the position of flight attendants was initially occupied only by female nurses. Gender marking, therefore, is present in the division of the internal space of the aircraft and the attributions so that the cockpit and decision-making authority are reserved for pilots, while passenger service and care are the female flight attendants' responsibility.

The traditional references of the profession to attract, entertain, and reassure passengers – and the naturalized attributes of women – are present. It is noteworthy that the career experience configures a turning point in the gender project regarding appearance, indicating another individual metamorphosis, based on the collective reference of those who are already flight attendants. Mica criticizes the lack of concern with image and weight gain, which is also considered a reason for the profession's loss of prestige and glamor, linked to emphasized femininity (Connell, 2018; Connell & Messerschimidt, 2013; Messerschimidt et al., 2018). "Airlines only hired tall blondes, usually single, they had these criteria, most were women, men were few, right...because women always were, are…are loose change, women's beauty on a flight attracts passengers" (Mica).

Anchored, above all, by sexism and homophobia, the social construction of masculinities is directly linked to men's relationships with women and with other men (Connell, 2018; Connell & Messerschmidt, 2013; Duncanson, 2015). It was reported that situations of machismo and prejudice occur mainly in the relationship between cabin crew and pilots, despite the many homosexuals in the profession, most of them men.

> They even say that there's a basis for it [preference for women or femininity] it's because in this pressurized environment, and sometimes when people are afraid or get very nervous, or they are heavily influenced by alcohol, you are better being served by this feminine touch. So, that's why sometimes, aviation has a preference even for effeminate men, regardless of whether they are gay or not, for more delicate men and for women too, the more delicate, the more girly she is, the more she goes, the more the airline will like her on its team (Tainã).

It is possible to notice that the social practices that involve the training and professional performance of the flight attendant reflect gender as a social embodiment (Connell, 2016). As

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their professional training is based on fitting a mold and follows a gendered perspective, men and women mobilize their retrospective path, building the individual project in a dynamic of constant metamorphosis (DeLuca & Rocha-de-Oliveira, 2016). Thus, it is possible to perceive the relational character between people, organizations, and contexts in the career.

DISCUSSION: GENDER PROJECT(S) IN THE FLIGHT ATTENDANT CAREER

The research allowed us to understand that the construction of the flight attendant career since the training course points to the formulation of a gender project (Connell & Pearse, 2015; Schippers, 2007) that reveals a hierarchy of masculinities and femininities, reproduces institutionalized sexism with its own traits and reinforces hegemonic masculinity and emphasized femininity (Connell, 1987, 2018; Connell & Messerschimidt, 2013; Messerschimidt et al., 2018; Schippers, 2007). Anyone who does not fit (Häyrén, 2016) in the mold – an expression repeated in the training courses – culturally and socially constructed for this project is out of the career. There are multiple messages of exclusion (Häyrén, 2016), whether in failure in course subjects, in comments about inappropriate clothing or posture, in the results of selection processes, peer review of failures, or the evaluation of airlines.

The predominant project is codified and marked by sanctions and norms that define – in addition to appearance – rules on desires, emotions, and feelings, classifying them as proper or inappropriate to normalized and gendered standards. Thus, the production of gender (Connell, 1987, 2016, 2018), found locally and in a relational way (Connell & Messerschmidt, 2013; Messerschmidt et al., 2018), is supported by objective and subjective gender practices concerning hegemonic and non-hegemonic masculinities and emphasized femininities, agreed upon collectively. To this end, the potential for individual metamorphosis is mobilized (DeLuca et al., 2016; Velho, 2003) so that professionals move, build and/or transform, adapting to the field of career possibilities.

In aviation's highly gendered and military environment (Barry, 2007; Castelitti, 2020; Whitelegg, 2007), the career appears linked to mobility and freedom, characteristics historically linked to the males. However, under the protection of the normative order of femininity (Connell, 1987, 2016, 2018), a "female work" space is built – based on seduction, delicacy, and the unique ability to make the hours within the pressurized environment of the plane a pleasurable experience, enhancing emotional labor (Barry, 2007; Sangster & Smith, 2016). As it is a career marked by a significant female presence, the deconstruction of the space of freedom is present in the relations with the male occupation (pilots) also linked to aviation. In this context, masculinities and femininities are gender projects perceived in everyday, dynamic and relational processes and actions, not a static configuration. The analysis of the gender project(s) that mold(s) the career of flight attendants can be produced in different stages, added and, sometimes, superimposed, in four relational points, a continuous process of negotiation and metamorphosis of individual projects (Velho, 2003).

First, the career is desired by young people who initially see the glamor of the activity, allowing a change of life for the remuneration and the lifestyle made possible by the constant movement, providing freedom and access to places that perhaps they would not access or would have more difficulty accessing in a traditional career. In addition, for young homosexuals, moving away from the context of origin is reported as freedom for greater expression of their sexuality (Tiemeyer, 2013). Career construction is structured in gender binarism and is guided by intersections that involve elements, sometimes in contradiction: militarization and the idea of security, characteristics of hegemonic masculinity (Connell, 1987, 2018), are structured in complementarity to a particular type of femininity, which harmonizes with the femininity/masculinity expected of the homosexual man. In the name of freedom, young people are willing to undergo individual metamorphoses that are, above all, regulated and directed behaviors to achieve objective purposes (DeLuca et al., 2016). When faced with conflicts and dilemmas (Hughes, 1937), the individual projects of aspiring professionals dialogue and negotiate the lived reality as they metamorphose projects inspired by the framework of gender projects that are collectively constructed.

Second, the field of possibilities for the career of flight attendants is mainly marked by the military heritage and the hierarchy of occupations. Training occurs by formatting flight attendants and pilots within this field. Homophobia is veiled but not absent, given that all aspects of the feminine are mentioned as subaltern, except for what serves as a complement to hegemonic masculinity – which is also the case with the acceptance of masculine gay men (Tiemeyer, 2013) in the career, but in a subordinate way, as pointed out in Connell's theory (2018). The discourse generated by the professional hierarchy requires adjustments in individual projects, which go through metamorphoses and negotiation and are compensated by the freedom and financial status provided. The field of action, which emerged as a space of labor freedom for women, was conditioned according to patterns of masculinity and femininity hierarchy (Barry, 2007; Sangster & Smith, 2016; Santin & Kelly, 2017; Whitelegg, 2007) throughout time, showing that gender practices involve dynamic relationships (Ferree, 2018) between people, occupations, and contexts. The activity that was initially predominantly female is now occupied by men who are subordinate to the hegemonic masculinity represented by the pilots. Even if a male flight attendant is not homosexual (which is the most frequent stereotype), his masculinity is subordinated to that of the pilots.

Third, the production of masculinities and femininities that represent the career is highlighted. The process is a gendered standardization or standardized gendering that starts in the training courses. Although the content has no relation to sex-gender, all learning is gendered. The movements are binary, indicating different ways of acting for men and women. The relationship with pilots is normalized in a hierarchy of masculinities and femininities: pilots (apparently, regardless of sexuality) represent the hegemonic masculinity and assume the top of the crew hierarchy. Other masculinities and femininities are subjugated to this one whenever they are in interaction, something that is constantly emphasized in the formation. In this sense, it is clear that there is a continuous movement between careers and contexts that approximate

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the perspective of Mayrhofer et al. (2007) with the theoretical framework of Connell (1987, 2016, 2018), which considers the dynamics of the social structure and the possibility of expanding and restricting collective agency (Messerschimidt et al. 2018), going beyond the notion of gender as attributes or individual and fixed characteristics. However, it is observed that collective constructions require individual metamorphoses. The set formed by hegemonic and non-hegemonic masculinities and by the emphasized femininity and its variations – in the sense of cooperation with the dominant gender regime (Connell, 1987, 2018; Messerschimidt et al., 2018; Schippers, 2007) – is a reference in the formation and in the stereotypes that have marked the history of the profession and that remain in vogue, in particular: the issue of the body, weight, age, and sexuality.

However, the interviewees perceive that there is a transformation process, especially concerning image and personal appearance, since, in their career experience, the demand does not occur with the same rigidity of the training courses. A new metamorphosis may be underway (DeLuca et al., 2016), and the idea that gender relations are historical and dynamic, and can be modified, especially at the local level, is reinforced (Messerschimidt et al., 2018), as in the case of organizational spaces. Commercial aviation is at the forefront of transport for the insertion of women at work (Barry, 2007; Whitelegg, 2007), the construction of a safe space for gay men (Tiemeyer, 2013), codes of ethics, and, recently, valorization of diversity and inclusion.

Fourth, collectively, in addition to the groups directly involved – female and male students and flight attendants – there is a diversity of professionals who are part of career training and who set the tone on what is technically required and what must be the mold to be fit in, aesthetically. This group includes military reserve, instructors who were flight attendants and/or who worked in vanguard airlines such as the Brazilian Varig, pilots, flight mechanics, personal image consultants, coaches, and photographers specialists in the flight attendant career. It is also the people who teach what one should think about the profession, going beyond the determination of the specific practice by pointing out other external concepts. Preparing flight attendants goes beyond training to perform in-flight activities in that it dictates how to do such activities on a gender basis.

It is noted that there may be masculinities and/or femininities that collectively dominate a profession and strain the metamorphosis to adjust individual projects within an expected gender project through individual objective and subjective negotiations. DeLuca et al. (2016) highlighted that any project, even if individual, refers to others or the social environment. This construction arises from the formation, which emphasizes security as a central point and reinforces the servile character expected in the occupation. Understanding gender relations as dynamic and relational and the exercise of power by consent (Connell, 1987, 2018; Messerschimidt et al., 2018), ideas intrinsic to the concept of hegemonic masculinity show the potential for change over time. In the professional field, the expression of masculinity and femininity as products of social interactions is inscribed and reproduced from the training process and marks even the relationships established between colleagues outside the workspace.

From the construction of the career of flight attendants, the importance of understanding the relationship between individual production and the body as a social practice that explains

the social structure of relationships makes sense (Connell, 2016). Furthermore, it can be seen that, in addition to the objectively produced aspects, due to the professional requirement of a gendered mold, it is through appearance, attitudes, gestures, and symbolic elements that masculinities and femininities are arranged. Gender "is about the linking of other fields of social practice to the nodal practices of engendering, childbirth and parenting […] gender in this connection is a process rather than a thing. […] If we could use the word 'gender' as a verb […] it would be better for our understanding" (Connell, 1987, p. 140). As warned by Connell and Pearse (2015, p.156), "our gender practice is powerfully shaped by the gender order in which we find ourselves." Thus, gender structure crosses all the contexts in which careers are constructed.

FINAL CONSIDERATIONS

This study advances the discussion on gendered careers by bringing the notion of gender projects intertwined in professional fields, empirically exploring the career of flight attendants. There are gender projects associated with careers that direct and shape women and men, regardless of sexuality, for the individual binary construction is considered appropriate-natural or inappropriate-unnatural in normative opposition. The gender framework guides social and organizational relationships of the collective career, favoring traditional references about expected and/or permitted masculinities and femininities, which makes it possible to extend this analysis to other professions and occupational spaces. It is noteworthy that, although it was not the focus of this study, the notion of gender projects is experienced in the imbrication of gender and sexuality.

It is recalled that the theoretical approach by Hughes (1937) and Velho (2003) discussed by DeLuca et al. (2016) gains new dimensions in the discussion of gender studies and the notion of masculinities and femininities as gender projects (Connell, 2016; Schippers, 2007). Alignment takes place through the marking of gender in the field of possibilities, regarding the career's objective and subjective aspects; in understanding the negotiation of reality and metamorphosis, linking conflicts and dilemmas faced on the way through different worlds; in the notion of project related to the recursion between person, group and institution, and in the notion of project related to memory.

Circulation in different worlds starts from the first day of entry of future flight attendants into the courses. Everyone must change how they dress, walk, sit, relate to their bodies, fix their hair, and take care of their skin and nails. The process does not deal with something individual because it includes the group; it presents "successful examples" of former students who were hired: "you either fit in, or you are out." Sometimes experiencing dilemmas and conflicts, the negotiation of reality takes place as the personal metamorphosis is experienced in the collective of the class and the institution. Those who are outside will perceive it. Due to the connection with gender, it cannot be said that such metamorphoses do not cause damage. The price to be part of certain "worlds," especially the "professional world," is to build an accepted project according to the ideals of masculinity and femininity.

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Therefore, the objective part of the career, in relation to status and positions, and, even more, the subjective part, the interpretations that occur in individual and collective interactions, can be experienced in a particular way according to gender. Dilemmas and conflicts arising from objective and subjective interactions during life are influenced by representations historically constructed for each professional place. If aspects related to gender are added to others, such as class, race, ethnicity, and sexuality, the objective and subjective possibilities give rise to other dilemmas and conflicts.

Gender specificities are present in the individual or collective career project and mark the field of available possibilities. The training of flight attendants goes beyond the limits of archaic standards of social order, emphasizing the differentiated demands of men and women on their bodies, translating hierarchy made up as security and a reference to tradition. Sex and biological determinism are expressed as a condition and limitation of the professional place to be occupied. Professionalizing, in this case, means fitting the mold. The exercise of masculinity and femininity is the basis for the construction of gender as a verb – as it is a process and action that can be attributed to any professional activity – and indicates social practices that can lead to career limitations for anyone. However, for experiences of gender and sexuality different from the heteronormative pattern, the strength of contexts and interactions between social markers of differences imply amplified challenges. Considering that the individual career is built through objective and subjective elements and that these elements are gendered, either by historical construction or by the individual interpretation itself, presenting the negotiated collective career and its potential for metamorphosis is another point of theoretical advance.

In a predominantly female career, the study in the field of aviation shows how the social construction of gender in different professional fields prioritizes hegemonic masculinity. For the field of Administration, the reflection brought in the study allows for a deeper discussion on gender inequality beyond the discussion of the wage gap and the man/woman binarism. Different masculinities and femininities permeate the organizational space and are hierarchized in workspaces and opportunities. Thus, we advance in the complexity of gender discussion in organizations, highlighting that it is impossible to adopt a single and binary view to understand how the barriers of inequality emerge.

A possibility for future studies is resuming pioneering research, such as that of West and Zimmerman (1987). They used the ethnomethodological approach to explore the constitution of gender in routine interaction and how people are made accountable for gendered behaviors in the most different spheres of social life. In line with interactionist research, which uses careers as a lens to glimpse collective social processes (Barley, 1989), such as institutions and societies, designing and metamorphosing into non-binary processes remains an individual challenge in the face of an institutionally and socially reinforced collective project. The sociological view with the lens of a career accompanied by gender allows us to transpose the neutrality of research in the area and move the social frameworks considering markers relevant to career and gender, which were shown to be intersected with the research results as sexuality and class.

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AUTHOR'S CONTRIBUTIONS

Aline Mendonça Fraga worked on the conceptualization and theoretical-methodological approach. The theoretical review was conducted by Sidinei Rocha-de-Oliveira. Data collection was coordinated by Aline Mendonça Fraga. Data analysis was performed by Aline Mendonça Fraga and Sidinei Rocha-De-Oliveira. Aline Mendonça Fraga and Sidinei Rocha-De-Oliveira worked together in the article's writing and final revision.

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ONLINE INNOVATION AND COLLABORATION IN THE CREATION OF FREE SOFTWARE

Innovation and online collaboration in the creation of free software

Innovación y colaboración en línea en la creación de software libre

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ABSTRACT

Advances in information technologies have led to user-centered innovation of artifacts from cyber culture. This advent of capitalism causes the emergence of approaches that contemplate collective and immaterial production in force in open source software communities. From a post-structuralist perspective, 6 interviews, 2 videos and an online discussion list were analyzed to appreciate the process of building the hegemonic discourse from the logic of equivalence, difference and fantasy. It was found that the speeches of the developers symbolize a presence yet to come, with the particular demands diluted in an equivalence chain that encompasses the largest number of claims, and that there is an effort to create an incessant process of generating value by overcoming the community frontiers, continuously articulating stakeholders to access resources and generate joint solutions in the innovation process.

Keywords: innovation with free software, online collaboration, pug-pe community, discourse theory, speech analysis.

RESUMO

Os avanços das tecnologias de informação propiciaram a inovação centrada no utilizador de artefatos advindos da cultura cibernética. Esse advento do capitalismo provoca a emergência de abordagens que contemplam a produção coletiva e imaterial vigente em comunidades de softwares de código aberto. A partir de uma perspectiva pós-estruturalista, foram analisadas seis entrevistas, dois vídeos e uma lista de discussão on-line para apreciação do processo de construção do discurso hegemônico a partir das lógicas de equivalência, diferença e fantasia. Constatou-se que os discursos dos desenvolvedores simbolizam uma presença ainda por vir, com as demandas particulares diluídas numa cadeia equivalencial que abarca o maior número de reivindicações, e que existe um esforço para a criação de um processo incessante de geração de valor ao ultrapassarem as fronteiras da comunidade, articulando continuamente stakeholders para acessar recursos e gerar soluções conjuntas no processo de inovação.

Palavras-Chave: *inovação com software livre, colaboração on-line, comunidade pug-pe, teoria do discurso, análise do discurso.*

RESUMEN

Los avances en las tecnologías de la información han llevado a la innovación centrada en el usuario de los artefactos de la cibercultura. Este advenimiento del capitalismo provoca la aparición de enfoques que contemplan la producción colectiva e inmaterial vigente en las comunidades de software de código abierto. Desde una perspectiva postestructuralista, se analizaron 6 entrevistas, 2 videos y una lista de discusión online para apreciar el proceso de construcción del discurso hegemónico desde la lógica de la equivalencia, la diferencia y la fantasía. Se encontró que los discursos de los desarrolladores simbolizan una presencia por venir, con las demandas particulares diluidas en una cadena de equivalencia que engloba la mayor cantidad de demandas, y que se busca crear un proceso incesante de generación de valor al superar las demandas. fronteras comunitarias, articulando continuamente a las partes interesadas para acceder a los recursos y generar soluciones conjuntas en el proceso de innovación.

Palabras clave: *innovación con software libre, colaboración en línea, comunidad pug-pe, teoría del discurso, análisis del discurso.*

INTRODUCTION

The current scenario is marked by cultural transformations that have been consolidated since the second half of the 20th century (Batabyal & Beladi, 2019), and are linked to the hegemony of so-called cognitive capitalism, which elects new information and communication technologies (ICT) as the strategic, symbolic assets of the new social production system (Cardoso, Boudreau, & Carvalho, 2019). In this line of reasoning, cognitive capitalism represents another effort to understand the context of the structural changes that constitute the contemporary world (Karakilic, 2019).

The development of new action strategies involves permanent interaction between actors with different skill sets, who are interconnected and exchange an increasing volume of information (Lee & Sohn, 2018). Thus, it is possible to develop ways to incorporate the users of ICTs in the creation and development of the innovation process. This approach represents a step forward from the view according to which companies generated their own ideas and then developed, financed, distributed and supported the entire innovation cycle (Chesbrough, 2003), as an action perspective that encompasses, coordinates and incorporates operations and provokes agents who are linked by innovative projects to rethink innovation strategies in a world connected via organizational networks (Cornelio & Cruz, 2014; Huizing, 2011).

In practice, the issue that arises on the horizon of innovation resides in building a discourse that implements design and development methods and incorporates the user's perspective in a world of open innovation. This inclusive spectrum of innovative action enables the producer of a particular artifact or technological service to account for the dynamics of tastes, preferences and demands for products, as a result of the continuous flow between activities that contemplate the interaction between producer and consumer (Nath & Liu, 2017). This scenario allows the defense of the hypothesis that user-centered consumption and development communities are successful when they receive an incentive from the platform to innovate and reveal their ideas, which can later become competitive in the market.

Here, we can mention the creation of a cooperative of intangible assets between actors who interact via the global computer network (Benkler, 2006; Eboli & Dib, 2013; Lima & Santini, 2008). Various instances of this phenomenon have been occurring over the last 10 years, such as the free software (FS) movement, which has become a global phenomenon and led to the development of an open, global and multipurpose functional platform, GNU/Linux (Cardoso *et al.*, 2019). This movement was born from the idea of exchanging information and cooperating, bounded by data management platforms in social networks.

By opening itself to a multiplicity of technology-intensive goods and services, ICT makes it possible for both industry and users to take ownership of this technology (Lee & Sohn, 2018). This perspective emphasizes the need to rethink the relationship between humans and technological artifacts, which, as in the case of FS, tend to generate a large number of techno-human interactions (Dong, Wu, & Zhang, 2019). Therefore, the contemporary production practices of FS and the communities that are formed for different reasons on the Internet represent, as Shahrivar, Elahi, Hassanzadeh and Montazer (2018) teach us, the emergence of new uses for the

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application of a given technology, which already has the appropriate conditions for developing innovative processes aimed at realizing creative solutions.

The discourse concept proposed by Laclau and Mouffe (2001) sheds light on the analysis of a community of user/developers of FS in Pernambuco: PUG-PE (Python User Group - Pernambuco). The analysis seeks to understand the hegemonic component in their discourse in the process of creating FS, using the three logics of discursive construction proposed by Discourse Theory: the logic of equivalence, the logic of difference, and the logic of fantasy. Actors are involved in the elaboration of equivalence between demands, but also in articulating a boundary that defines the limits of their project by the logic of difference. The logic of fantasy provides support for the community's political projects and the individual user/developer's choices.

The need to identify a new language that reveals new social practices that affirm a more effective constellation of governance for emerging innovation processes resulted in the following research question: How does the hegemonic discourse of the developers of the PUG-PE community occur in the context of an online innovation and collaboration process that involves FS?

By choosing the political perspective for understanding the strategies of the PUG-PE group, we want to advance in relation to the functionalist approaches of studies that analyze just the administrative capacity of communities to attract and retain users. This choice also allows us to contribute to discussions in many disciplinary fields, such as the view that FS is limited to a debate on the natural evolution of ICTs, as Steiniger, Fuente, Fuentes, Barton and Muñoz (2017) believe from analyzing urban information systems, such as the simple implementation of electronic devices, addressing the copyright controversies developed by Lessig (2004), issues involving the green patents of Bretas *et al.* (2019), or even public technology policies, as proposed by Heikkinen, Savina, Partanen, Seppälä and Pearce (2020) for discussing the national strategy of open-source hardware in Finland.

Among all these various gaps in the research is research related to open-source technologies, with values such as collectivity, connectivity, collaboration, and shared objectives that result in political disputes occurring in the realm of discourse.

COLLABORATIVE INNOVATION WITH FREE SOFTWARE

The technological system of new ICT will be of no importance in the social field if it is not recognized as a key component of cognitive capitalism (Tseng, 2009; Tutusaus, Schwartz, & Smit, 2018). In the context of Organizational Studies, discourses about what is new and about innovation have been explained from the perspective of a social transformation of the "knowledge society", in which information manifests itself as the main productive force (Cocco, Galvão, & Silva, 2003). Thus, open-source software, a term coined by Eric Raymond, can be presented as an example of the implementation of the diagram of cognitive capitalism.

When talking about user innovation, it is important to highlight the education they have with regard to the new means of production (Jenkins, 2006), making the relationship between users and industries twofold. The consumer can become a producer, and even if some large

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companies underestimate the value and influence of these practices, they occasionally take advantage of social production in relation to their products (Loureiro, Romero, & Bilro, 2019). Sometimes there is an appropriation of participatory culture to increase profits (Zhang, Gupta, Sun, & Zou, 2020). For example, some videogame companies have strong communities that provide them with feedback on their games and also generate mods (modifications) or software that improve the quality of their products (Cornelio & Cruz, 2014). Thus, a concept such as *prosumer* represents the hybrid nature of immaterial production today.

The current economic dynamics require an understanding of the different theoretical currents that point to knowledge as an important variable of innovation (Ruoslahti, 2020). Theorists such as Friedman (1953) and Becker (1962), for example, highlight the importance of technical and organizational innovation for capitalist development (Possas, 2008). Given the multiplicity of views on the subject, however, Slappendel (1996) suggests synthesizing three research perspectives: the individualist perspective, the structuralist perspective and the interactive process perspective.

The interactional perspective may be an effort to reduce the gap between individualistic and structuralist views by inserting them into the same innovative effort development process, by preparing a model that encompasses the interface between individual and structural factors (Wang & Li, 2019), but also presupposes innovation as a collective and interactive action, the results of which come from the effort of aligning individual, organizational and contextual elements. (Slappendel, 1996).

The perspective of the interactive process does not seem to escape the unilaterality of most innovation studies, or adapt to the particularities of cognitive capitalism. By considering knowledge to be a neutral resource, software producers continue to suppress political and cultural aspects from the process by establishing a boundary between creators and users, depriving the latter of the opportunity to participate in continuing innovation (Liu, 2017). Thus, they do not consider the opening of borders provided by the new ICTs as support for the new generation of innovation processes and business models.

The critical appropriation of the traditional paradigm of innovation represents an effort to understand the emerging phenomenon of disruptive innovation, which is continually operationalized and developed by agents with an aptitude for bricolage (Taques, López, Basso, & Areal, 2020). Authors such as Ortt and Duin (2008) point out that there is a tendency to replace the linear and endogenous innovation models of the individual firm with a networked, exogenous, multidirectional and chaotic process model, which allows users to participate in the new ICTs.

Online collaboration in the development of free software

Online collaboration is a phenomenon that has the potential to change lives and challenge hierarchies (Betzing, Kurtz, & Becker, 2020). It comprises collaborative social media interactions (Castells, 2010) that allow for participation in organizational processes outside the organization's boundaries (Lee & Cole, 2003), and include users and other external actors (Hemetsberger & Reinhardt, 2009). Online collaboration is associated with topics such as the creation of knowledge

(Lee & Cole, 2003), product innovation (Jeppesen & Frederiksen, 2006) and the development of activity systems (Hemetsberger & Reinhardt, 2009).

Lee and Cole (2003), who study online collaboration in FS development, propose a knowledge creation model that is based on community learning. They believe that learning is a collective process of identity formation and acculturation in communities of practices (Brown & Duguid, 1991; Fernandes, Fernandes, Paiva, Leão, & Costa, 2020), in which practitioners may be geographically dispersed; what classifies them as a group is the practice, the métier.

FS is developed in a process of collaboration between volunteers. According to Lee and Cole (2003), the contributions of the different developers are not regulated by a formal contract of paid service, but rather by cultural and legal norms whose mechanisms, which underpin the knowledge building process, can be understood in terms of at least four aspects: 1) widely shared, knowledge building blocks; 2) incentives to contribute as the FS community volunteers; 3) coordination under conditions of uncertainty; and 4) orientation towards quality innovation processes.

In the case of FS communities, Lee and Cole (2003) teach that cultural and legal norms allow for the emergence of the parallel code and two-tier task structures that characterize the processes of the operation and provide a visualization of how it works. The parallel code structure refers to the simultaneous existence of two versions of the same software, a stable version and a test version (Betzing *et al*., 2020). All work is developed on the test version, until the software is considered satisfactory and safe for inclusion in the stable version. This practice enables experimentation, errors, criticism, and error correction.

The context of the Discourse Theory of Ernesto Laclau and Chantal Mouffe

The term that describes the work of Laclau and Mouffe (2001) well is the Discourse Theory (DT), which these authors describe as a "structured totality resulting from articulatory practice" (Laclau & Mouffe, 2001, p. 105). In this discursive logic, articulation represents "any practices establishing a relationship between the elements in such a way that their identity is modified as a result of the articulatory practice" (Laclau & Mouffe, 2001, p. 105), and hegemonic articulation as the "formation of a political and moral-intellectual leadership that involves the articulation of a variety of ideological elements in a common political project that modifies the identity of the political forces behind it" (Howard & Torfing, 2005, p. 12).

DT also introduces the concept of complex society that is totally reconceptualized in discursive terms, consisting of a multitude of identities resulting from articulations (Deligiaouri, 2019). Thus, the social component is permeated by antagonisms and characterized as the realm of discursive differences that are homogenized with the formation of chains of equivalence vis-à-vis a purely negative exterior, that is, an exterior that constantly poses new threats to discursive stabilization.

DT privileges the dynamism of societies and different social groups, which construct and deconstruct themselves in multiple arrangements, the producers of unstable, exchangeable

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and sometimes hegemonic meanings (Laclau & Mouffe, 2001). One of the central concepts of DT that is fundamental to our study is hegemony, which is defined as political, moral and intellectual leadership, which depends on the construction of a discursive formation that provides the basis for the inscription of a wide range of demands, visions and attitudes (Torfing, 1999). In the discursive field, it represents the target of permanent debate between the narratives that are in dispute. In this scenario of different conflicting meanings, hegemony occurs when meaning is fixed around a nodal point (Deligiaouri, 2019).

Three fundamental logics of DT come into play in this (impossible) search for plenitude: the logic of difference, which helps demarcate discourse boundaries; the logic of equivalence, which articulates equalities between agents or between a number of different "others"; and the logic of fantasy (or phantasmic logic), which provides the means for understanding certain specific social practices, and how subjects adhere to certain regimes. Fantasy serves to ensure that the radical contingency of social reality remains at the bottom (Glynos, 2008; Stavrakakis, 2004).

METHODOLOGICAL PROCEDURES

In this study, we assume that technology users have been underrepresented in the current discourses on innovation. The work of translating their views into technical parameters is done through the lens of the experts who run the tests, for instance.

In this sense, we propose to investigate the hegemonic component present in the discourse of users/developers of the PUG-PE community, in order to understand how they can be active subjects in defining the functionalities of certain software, that is, in the technical choices that determine the configurations of a software. By entering this field of discursivity, we intend to unveil how the production process extends the innovative work of assigning a different use to software, and can also create a new object in the market. This situation means that there may be an alignment between the identity of the user and that of the innovator.

The matter under study is based on understanding how the hegemonic discourse of the developers of the PUG-PE community occurs in the context of the innovation process using FS. We chose to make use of discourse analysis investigations, a strategy that aims not only to capture the way the word is proclaimed, but also to analyze its meaning. For this perspective, the positions revealed by the subjects, and likewise by the objects, are based on their discursive practices. In these terms, subjectivities are produced discursively (Fernandes, Fernandes, Paiva, & Melo, 2014).

The documents analyzed were the result of two videos about a Brazilian meeting for developers of the Python programming language (Community Overflow [V1] and Building successful communities [V2]), and six interviews conducted with FS developers from the PUG-PE community (Gileno Alves [E1], Marcelo Caraciolo [E2], Renato Oliveira [E3], Marcos Egito [E4], Daker Fernandes [5] and Henrique Foresti [6]). The conversations were based on an itinerary of questions that aimed to achieve theoretical-empirical progress (Fernandes *et al.*, 2014).

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The study participants were intentionally selected, considering their expressive representation in the discursive field in question.

Data were analyzed in three different stages, as suggested by (Fernandes et al., 2014). In the first stage, the data were arranged in order to better investigate the contents we had collected. The second stage was marked by carefully reading the collected data to obtain a broader perspective of the knowledge we had gathered, and to reflect on its significance. In the third and final moment, we interpreted the results we had achieved. During data analysis, each portion of the data was assigned an identifying code, such as E1, § 1R1, where the numbers after the letters correspond to the count of the interviews (E), the paragraph (§) and the reference (R) being highlighted. In Exhibit 1, we present the analysis protocol that we used in the analytical stage of the study. The data from the videos were presented as follows: V1, 01:00-02:00, where the letter V corresponds to the video, followed by the time reference corresponding to the discourses.

Exhibit 1. Five-step research process

IDENTIFY PUG PE
Develop a dense description of the context
Unstructured interviews
Documents and published works of the group
Transcription
Coding in NVIVO
OUTLINE THE STORIES THAT MAKE UP THE GROUP'S DISCOURSES
Search in the online databases of Python Brazil and International
Access magazines of free online software
Access the online mailing list
Identify the lectures and videos of the group members
Semi-structured interviews
EXPLORE THE DISCOURSE REITERATION STRATEGIES IN THE AGENTS
Analyze the online mailing list
Identify and highlight key leaders
IDENTIFY THE STRATEGIES FOR THE CONSTRUCTION OF THE GROUP'S DISCOURSE
Identify equivalences, differences and fantasies
Interpret these discourses
INVESTIGATE THE CONSTRUCTION LOGIC IN THE COMMUNITY'S DISCOURSE
Inferences about the hegemonic component in the discourses of the developers of PUG-PE communities

The proposed inferences are supported by the DT of Laclau and Mouffe (2001), whose foundation is based on the meanings of discourse, hegemony and the three logics of discursive construction: the logic of equivalence, the logic of difference, and the logic of fantasy.

As a way of maintaining the integrity of the analytical procedure, the investigation auditor was present for the debate and results' construction sections, which helped with analysis validation. Constant reflexivity is a way of overcoming any of the limitations that surround research dealing with contingent and dynamic scenarios (Fernandes & Silva, 2015). For Alvesson and Skoldberg (2000), reflexivity is an element that leads to greater security for the operational procedures of research, and a condition that generates transformations in the researcher.

ANALYSIS OF THE RESULTS

This step is based on the establishment of a discursive fixation point around which certain articulatory chains are developed. These chains are constructed from aligning the different individual and organizational demands that influence each other, and are characterized by the construction of a hegemony of discourse. In our case, the interpretative effort was to characterize the articulation of a discourse that constructs equivalences as a way of contemplating innovation that is centered on the contributions of the FS user/developer through the differentiation of practices that deny collective, immaterial and developed production in current flow in open-source development communities. Fantasy, in turn, provides the elements that give credibility to these discourses, in order to captivate the stakeholders with support, in an effort to become hegemonic discourse.

The logic of equivalence surrounding the discourses of the developers of PUG-PE

As in every equivalence chain, the moments of discursive constitution of the PUG-PE community as the "open-source project of software development" are not subordinate to all the demands that go to make up this articulation between key actors of the equivalence chain of that ecosystem, even if this demand variability constitutes a primordial condition to ensure its existence.

With regard to Python, some of the elements articulated in this equivalence chain can be summarized as: 1) interpreted programming language and, therefore, geared towards the programmer's efforts; 2) easy to learn, and highly productive and innovative activity; 3) multiparadigm: object-oriented, functional and procedural implementation; 4) cross platform, open source and fun. This equivalence around Python is critical to the goal of preserving an inclusive environment oriented towards all users/programmers and directed towards ensuring the support of stakeholders. Thus, the support of these successful equivalence chains requires a continuous reiteration of these discourses, and the emergence of general equivalents is a way of maintaining the PUG-PE discourse as a space for innovative projects in Python.

The differences in worldviews between developers are equivalent in discursive fixation points to "collaborative environment" and "community", in which equivalences are maintained in the order of their demands, as happens when developers reiterate, for example, that PUG-PE

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meetings are one of the most significant technology events in Pernambuco for stimulating programming, participation and collaboration, or bringing an aura of shared and inclusive space of technological exchange, as shown in the words of Marcel Caraciolo (MC).

> Another point is that I like this collaborative cycle and I think it's important to exchange information, and one of the motivations for participating in these free software communities is the exchange of information. I did one thing in way X and another in way Y. If I hid the X way of doing the thing, I wouldn't figure out the potential failures or improvements that I could have. So, the idea of exchanging this information is a cool thing of these free software communities, and you won't pay anything for it, you'll only be exchanging knowledge (E3, § 6R3).

This represents the existence of the elements that express the constitution of the identity of actors belonging to a group that can provide them with good experiences, together with the fact that after 2010 PUG-PE expanded its technical online collaboration activities to include several other universities (more than ten in Pernambuco) and, therefore, to attract the attention of local companies that start using this programming language in their projects. This effort to position PUG-PE as one of the main technology encounters in Pernambuco, therefore, is the result of the integrative strategy of defining themselves as the most active developer community in the city, which is competing to match or surpass the traditional Java, one of the main programming languages used by local businesses.

The successful strategies of including Python as a viable option for the local business community are due to Marcel's competent leadership, which is recognized by the other members, and to the efficiency and simplicity of the language, which eventually attracts other stakeholders, thereby "increasing the critical mass" of the group. The group's current success is aligned with the success narrative of most ICT-related ventures, which alludes to the story of an agent who alone believes in his/her idea and manages to aggregate key people from the environment, and so paves the professional way for achieving business success. The following excerpt illustrates the reiteration of this rhetoric in this process:

> [...] we started small there at the Informatics Center UFPE. It all started there, but we started evolving, evolving and today we have a website, a mailing list, blogs, and a video channel that are well organized now... We started very slowly by promoting small courses in 2009. In 2010, we started having meetings with new participants, and the more meetings we did, the more people showed up... So, we've done a lot of things that justify who we are today... We have a good set of companies that use this technology, such as Nokia, for example, and particularly the startups, and we even created a tool that mediates the success of candidates for election with their voters... So do it, do it, do it. There's no point in standing still. I got there at Cin, saw what I had to do and together with some friends we started to make things happen (V1, 07:35-15:00).

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The metaphors that dominate this narrative of the group's history report a "difficult start" with "several failed attempts" until a "chaotic agent" appeared, Marcel Caraciolo, who began to give a new direction to the destinies of the group. It "gains critical mass" and visibility in the local ICT scenario, and attracted the attention of "researchers, companies, enthusiasts, developers and paratroopers" who have an interest in technology, and so they strive for Python to advance in the state. The differences in world view are equivalent in the points of discursive fixation to a "successful community", maintaining the equivalences in their demands, as shown in Figure 1, which is composed of excerpts from PUG-PE's mailing list (Exhibit 2).

Exhibit 2. The equivalences of the "successful community" signifying chain

Mailing Lists - § 1 coded reference [33.71% Coverage]	Hello guys After giving more than 20 lectures in February alone, with an estimated audience of more than 3,500 people who have watched these videos, we're very happy to receive the staff and speakers who have been involved in the cause [---] We're promoting improvements in the hangout app in partnership with PyCursos/Pingmind that will make it even easier to promote the talks throughout the month. The lectures are free and any person can participate! If you have some Python-related ideas or projects, here's a great opportunity for you to present what you know to people who are interested in the subject or experts on Python, networking and sharing technical experiences.
Mailing Lists - § 3 coded references [47.55% Coverage] reference 1 [36.39% Coverage]	Hello everyone, I would like to congratulate everyone involved in holding the III PUG-PE Meeting today at the Informatics Center-UFPE. I'd like to say that I was very happy today to see a number of people that I never imagined for our meeting. A lot of people stopped me in the hallways, asking: "Is this where the meeting's happening?!" I couldn't believe it! This is proof of the effort and work we're doing to keep this group moving forward. I'm not exaggerating, but we have all the potential to become a host-candidate in the coming years of Python-Brazil. Proof of that?! Today we had people from Alagoas (PUG-AL), people from Paraíba and people from Recife. This integration is fantastic!
Mailing Lists - § 1 coded reference [11.35% Coverage]	Guys, I tell you with great satisfaction that the article about our community was published in *Revista Espírito Livre* (Free Spirit Magazine), one of the most outstanding Brazilian magazines about free software. The article is on page 72!! http://revista.espiritolivre.org/pdf/Revista_EspiritoLivre_029_agosto2011.pdf Congratulations to everyone here, you built this: Onwards!
Mailing Lists - § 3 coded references [17.08% Coverage]	Guys, I inform you that the group of Python users from Pernambuco has joined the *Células Empreendedoras* (Entrepreneurial Cells) network. This followed the formalization of the group, which has become our first python entrepreneurial cell. I believe this group can motivate and lead the creation of Python cells throughout the state. May this group serve as an example for many of us, with the entrepreneurial organization it has.

The function of these narratives, therefore, is aligned with the perspective of Deligiaouri (2019) when he states that they refer to the strategies of discourse simplification in order to enunciate a discourse that is more accessible to others who are part of the equivalence chain;

that is, people from different origins, with different perspectives on the group's complex issues, "identify " with this discourse, creating a network of equivalences and eliminating differences. They mobilize to build an equivalence chain involving the various arguments and meanings of PUG-PE. This means that certain issues and topics of interest can be debated and analyzed within the community.

The equivalence networks of "business success" cancel out the differences between the community and the companies who use and produce software, and highlight the differences with the education systems taught in the colleges and universities with which it maintains partnerships; or between community and government programs that encourage entrepreneurship and technological innovation. This institutional action is marked by the formulation of an articulatory strategy that extends from the network of equivalences beyond the boundaries of the community and leads it towards the universal sphere, because it produces a desirable discourse of identification (Chan & Li, 2010).

Logic of difference: community and market versus developer and community

Understanding the differences between the moment-elements that are part of the discursive chain "community" helps when it comes to understanding the equivalential bonds that create discursive connections in this equivalence chain. Moreover, it is worth mentioning that the idea of identity infers difference, that is, if there is no difference this may mean that we are dealing with the same subject, because PUG-PE builds its identity from the existence of other distinct identities. Such is the case with communities that adopt other technological approaches, as shown in the excerpt from the interview of Marcos Egito (ME):

> People exchange pieces of code in Python without complication. In the case of PUG, there is an open mailing list. You just need to register, and if you have any questions about the code, you have a group of people who are willing to work with you on it. There's no kind of restriction like, uh, you're not a partner, you have to pay X. There is none of this that happens in other groups out there (E4, § 10R2).

In relation to the market, this difference occurs from a strict logic demarcated by only aiming at profiting from technology (the utilitarian view), forgetting the dimension of the passion of users/developers for technology (the playful dimension). The work by Benkler (2006) is elucidatory in this sense when he argues that the development process of open-source software is based on a peer production mechanism, and is not similar to the classic market and business model. If we proceed from Iannacci's (2005) understanding that "transparent, community-based production with a collaborative management model was the greatest innovation of Linux" (p. 48), then the strict logic of the market may constitute the antagonistic perspective that defines the "other", the difference that has a dichotomous relationship with the discourse demands of the Python community of Pernambuco, as can be seen in the following excerpts.

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> I see those businesses as a future threat to certain types of communities. But for Python, I find this difficult to happen because the community itself is made up of many people and does not have a company controlling everything. But you never know about tomorrow, do you? (E2, § 3R3).

> The use of free software or the matter of participating in communities, contrary to what most people think, is not only for the little penguin, but I go to the essence of it. So today I make use of free software, and use it in my classes, without generating and stimulating the disparities that are already in the market (E4, § 2R1).

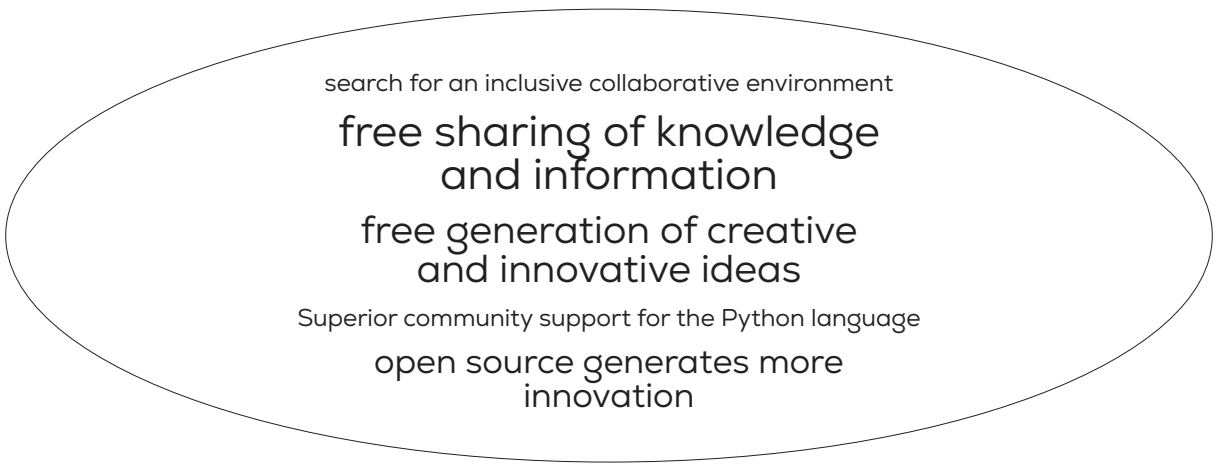
Under this logic, the difference condition is the element that allows articulatory practice to take place, through the same differences that combine in a precarious and contingent way, in a nodal point that has the characteristic of expressing a common meaning to them. Once again, it is difference that enables the articulation between interagents of the equivalence chain.

The universality of this logic of difference goes beyond the political field to reach the normative field (Dong *et al.*, 2019). Based on certain data, such as the number of monthly meetings, the number of members, the volume of startups that use Python, the number of universities that have established partnerships, the amount of footage recorded on video channels and the number of projects posted on GitHub, Marcel Caraciolo argues that PUG is different from other developer groups.

The logic of fantasy forging an inclusive collaborative environment

The logic of fantasy provides support for the community's political projects and the choices of individual users/developers. The fantasies are basically supported by the discourses shown in Figure 1:

Figure 1. The discourses of fantasy



These thematic constructions are obvious ways of thinking about how the community is affected and sustained by fantasies. These structured desires phantasmally shape the nature and content of the demands of developing users, and structure how emerging questions are answered. The two excerpts below are indicative of this when the interviewee refers to the Python programming language:

> It's a high-level language used in many environments such as Linux, Windows, Mac. It's what's called cross-platform interoperability. Another important key aspect that I like to draw attention to in Python is that it's being used a lot in universities to teach programming. So this is fantastic (E2, § 1R1).

It should be noted here that the Python programming language is vested with properties that exceed its purely technical components; when, for example, this programming language appears in individual narratives as something fantastic, superior, fun, innovative, competitive, it becomes the object from which users/programmers experience sensations of heroism, freedom and autonomy in the effort to control their performance.

Fantasy plays a fundamental role in constructing and supporting the community's discourse and in the relations established between its members. Glynos's (2008) view of this process highlights that features that are often confused coexist with both ideological and normative aspects. The ideological aspect would be in the discourse of the community that tries to present PUG-PE as a closed and homogeneous totality, through the fixation of a nodal point, and in its non-recognition of the infinite world of differences (Laclau & Mouffe, 2001). In other words, ideology would be in the desire to build the discourse of totality. At the same time, the normative signifier of the ideological dimension of fantasy would be related to the function of maintaining the political character of relations in the community, which are associated with the production, appropriation and distribution process of knowledge and information.

Fantasy promises a harmonious resolution of social antagonisms, since it provides a filling for the emptiness of discourse. For Stavrakakis (2004), only in this way can the discourse be constituted as a desirable object of identification, as shown in the excerpt below:

> The community really attracts a lot of people. And not everyone is there necessarily out of interest in Python. You'll see people who go there because they have an idea and want to share it, they have a problem and are looking for a solution and think the community can help them. So, the community diverges from the scope of technology and begins to expand (E2, § 6R4).

Fantasy organizes and supports the apparent multiplicity of identities, aligning itself with the study of Glynos (2008), when he explores practices of the workplace that are recognized from the aspect of fantasies. Thus, the results show that one of the structuring fantasies of the workplace concerns leadership, particularly individual leadership, which is experienced in hierarchical

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superiors: examples of this would be leaders who are careful, or accessible or omnipotent. The motivation for programmers to want to stabilize the community's discourse to support fantasy should not be confused with rational actors who seek to satisfy their interests, but rather with actors whose identity is dependent on discourse. The incompleteness of the discourse forces the actor to build a complete illusory identity through acts of identification (Howard & Torfing, 2005). In this sense, the actors are strategic and non-rational, that is, the community's articulators act in order to improve communication effectiveness with its members through the production of useful knowledge, which has a chance of being adopted by the participants or improved by the market. The phantasmic logic of discourse also operates when the subject is invested in some fantasy, in such way that anything that would destabilize the phantasmic narrative of the subject is seen as a threat.

The logic of fantasy helps us understand how the process of innovation production occurs in the PUG-PE community, since this logic reveals the community's ideology and, thus, how the effort is developed to insert or transform the existing social logic of the production, appropriation and distribution of information and knowledge (Betzing *et al.*, 2020).

Construction of the hegemonic discourse of developers of PUG-PE

The scenario in which PUG-PE emerges is entangled with discourses that call for new models of innovation management, a new approach to services, and the constitution of new collective identities that meet the rigid hierarchies of the industrial era (Taques *et al.*, 2020). These issues stand out in the hegemonizing discourse of the developers through the logics of equivalence, difference and fantasy.

The concept of hegemony is fundamental to DT, since it represents the particular element that has the function of symbolizing an absent fullness (Laclau, 2005). The process of its constitution as an equivalence chain has, as its starting point, the chain of discourses that enunciate the preservation of a community sense of a group of people who share certain values that differentiate them from other groups, and other market proposals by maintaining the status of an "experience-sharing group that had a slow and difficult start", as shown in the excerpt from a video by Marcel Caraciolo presenting PUG-PE:

> [...] the PUG-PE mailing list started in 2007, and at that time, having meetings was complicated because usually people would not attend them. To give you an idea, the first meeting was in the Bugaloo restaurant, but people want to code and not eat, and no one came, just the one guy. The years 2008 and 2009 were more or less like this (V2, 3:02.1-3:20.5).

In this process of establishing an identity of its own, it managed to leave a small cell and has evolved, and today is recognized as "one of the main open-source technology meetings in Pernambuco". The clash of interests, benefits and losses that is established in this process of

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discursive construction, the search for the discourse hegemony "of the successful community", is aligned with elements of fantasy, such as the fact that it is a FS group that "cultivates diversity and innovation" (E3) in a context where market competitiveness demands trained, creative and self-employed professionals at work.

In the universe of interagent groups, equivalence chains are built that establish nuclei around which discursive elements align, linked by a concern with celebrating the expected gains from insertion in an open innovation chain, organized in a network of information flows in which PUG-PE is a disseminator of intelligence in Python, so establishing connections with different stakeholders. This discourse originates from the mixture of post-Fordist arguments claimed by the expansion of the notion of the "new economy" that gained notoriety with the work, The Network Society – The Information Age, by Castells (2010), who calls this new hegemonic productive model "informationalism". There are also contributions from Gorz (2005) that provide formulations about "immateriality" and the loss of the usual measures of labor value.

CONCLUSION

The aim of this study was to reveal the hegemonic component present in the logics of the discursive construction of PUG-PE's developers. These agents want to position collective and immaterial production in the circuit of innovation production, but without succumbing to the strict logic of linear market innovation and the current intellectual property regime. In practice, the challenge is to build a discourse that implements methods of conception and the development of innovative ideas that allow the incorporation of the user/developer perspective, that is, that allow the innovation approach that is centered on the firm to expand.

In this sense, we recapitulate the fundamental question of the study: How does the hegemonic discourse of the developers of the PUG-PE community occur in the context of an online innovation and collaboration process that involves FS? Phantasmic logic plays a key role in protecting against displacements by strengthening identity and articulating part of the group's rhetorical strategy. In this sense, in view of the need for PUG-PE to survive, it was necessary to build a discourse that presented the particularities of the group as having the conditions needed to meet the demands of different users/programmers in their efforts to satisfy their passion for the Python programming language, improve their skills, work on a project, acquire the skills required in the labor market, set up an ICT startup, and explore an innovative idea.

The PUG-PE community is a body that is divided between its own particular discourse of differentiating itself from the business logic, and the more universal signification of not ceasing to receive new meanings. This expansion of the equivalence chain corresponds to an operation of hegemony. This scenario confirms the hypothesis that the success of the PUG-PE community depends on the aggregation of subjects who are curious about technology and who seek to differentiate themselves through their skills and be guided by quality in innovation processes. This represents a way to participate in innovative projects that attract the attention of the market and eventually compete with market distribution by creating their own startups.

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The contribution of the study lies in its adoption of the DT approach, which reveals the tensions and constant changes that are part of the world of PUG-PE's developers, moving one step beyond the reductionism of structural determinations, such as economic interpretations that are solely guided by the logic of the market and that leave aside the logic of the social and the political, such as firm-centered innovation approaches, which are questioned by authors such as Chesbrough (2003) and Chesbrough and Henry (2006). It also allows us to question the Utopian views of new ICTs that claim beneficial transformations for society, putting this discourse into perspective and showing the particular demands that conceal it.

DT also provides the opportunity to understand FS projects as a political and socially localized construction, an approach that is not found in academic writing and the discourses of FS development communities. At the same time, it makes it possible to think of innovation as a process related to issues of political dispute and discursive strategies.

Finally, the PUG-PE discourse works by symbolizing a presence that is yet to come. Thus, each of the members of this community are abstractly related, since their demands and questions are symbolically diluted in a community equivalence chain that has to divest itself of part of its meanings so it can understand a greater number of demands, and so the construction logic of this discourse can be understood, basically by identifying demands, general equivalents and fantasies.

From the point of view of the potential implications/contributions of these findings for managing innovation in communities, they should orbit, fundamentally, around the individuals who are part of them, more than the technological and infrastructural devices they have for generating innovations. In this sense, it is necessary to use innovative processes that are distanced from the traditional organizational routine, developing a creative environment that is oblivious to classical administrative tasks and the strong division of labor, allowing for the creation of new ideas. Rules, regulations, governance strategies need to be aligned with individual demands, so that there is the necessary identification between the objectives of the community and those of individuals.

As strategic actors can exercise their agency as something that is not fully realized, this means that they have to articulate with agents from organizational structures to meet their objectives in a recursive and dialogical process, given the contingency process that involves the actors and structures. This harmony is necessary in the relationship between the user community and the firms in order to increase the chances of achieving individual and collective objectives. The exchange of ideas demands an organizational environment that is receptive to newcomers and to situations that lead to possible diversity and renewals in investments in creative solutions.

The individual subjects who are active and the protagonists of these innovation movements require a focus that adds the financial perspective, technical efficiency and the satisfaction of the passion for the technology used that can represent organizational actions to be adopted by the communities; that is, traditional managerial actions, such as professional training, certifications, bureaucratic processes and monitoring conceived of from a classical viewpoint are useful in other contexts because they do not achieve the same results in the context of open-source

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communities. Organization in open-source communities does not guarantee innovative processes/product generation, but is related to the creation of the cultural and structural standards that are developed in communities to enhance innovation.

Although the study was conducted with a FS development community, this approach to discourse can be used to reveal other tensions that emerge as a result of the transformations that the information economy and its effects generate in the software industry, music, film, book, and other sectors where divergence overcome convergence. It would also be interesting to conduct studies with an academic inspiration using other research approaches, as a way of enabling a future meta-analysis of the propositions addressed here in other studies.

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AUTHORS' CONTRIBUTIONS

The authors declare that they participated in all stages of development of the manuscript. Nelson da Cruz Monteiro Fernandes and Fernando Gomes de Paiva Júnior worked on the conceptualization and theoretical-methodological approach. The theoretical review was conducted by Osiris Luis da Cunha Fernandes. Data collection was coordinated by Marconi Freitas da Costa. Nelson da Cruz Monteiro Fernandes, Fernando Gomes de Paiva Júnior, Osiris Luis da Cunha Fernandes and Marconi Freitas da Costa participated in the data analysis. All authors participated in the writing and final review of the manuscript.

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THE MANAGEMENT OF URBAN SOLID WASTE IN MEXICO: A CASE STUDY FROM AN ORGANIZATIONAL PERSPECTIVE

Gestión de residuos sólidos urbanos en México: Un caso de estudio desde la perspectiva organizacional

Gestão de resíduos sólidos urbanos no México: Um estudo de caso a partir de uma perspectiva organizacional

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ABSTRACT

The management of urban waste is a problem for any city, but recent studies have ignored the management of the entities responsible for this issue. To solve this, a case study on urban waste management with a holistic organizational analysis methodology is presented. With this methodology, a profound and systematic approach to the constitutive dimensions of and organization is achieved, which contributes to the understanding of management in complex environments. The study is made about the responsible entity of urban solid waste management, in the second biggest city of Mexico, Guadalajara, and who lives a serious problem in the field.

Keywords: Organizational analysis, urban solid waste management, case study, organizational theory, Mexico.

RESUMEN

La gestión de residuos urbanos es un problema por resolver en toda ciudad, pero los estudios recientes han soslayado la gestión de las entidades responsables en el tema. Para solventar esto, se presenta un estudio de caso sobre la gestión de residuos urbanos con una metodología holística de análisis organizacional. Con esta metodología se logra un acercamiento profundo y sistemático a las dimensiones constitutivas de una organización, lo que abona a la comprensión de la gestión en ambientes complejos. El estudio se centra en la entidad responsable del manejo de residuos urbanos, en la segunda ciudad más grande de México, Guadalajara, y que vive una problemática grave en el rubro.

Palabras Clave: *Análisis organizacional, gestión de residuos urbanos, estudio de caso, teoría de las organizaciones, México.*

RESUMO

A gestão de resíduos urbanos é um problema que deve ser resolvido em cada cidade, mas estudos recentes têm negligenciado o gerenciamento das entidades responsáveis pelo problema. Para resolver isso, é apresentado um estudo de caso sobre gerenciamento de resíduos urbanos com uma metodologia holística de análise organizacional. Com essa metodologia, é alcançada uma abordagem profunda e sistemática das dimensões constituintes de uma organização, o que contribui para a compreensão do gerenciamento em ambientes complexos. O estudo é realizado sobre a entidade responsável pela gestão de resíduos urbanos, na segunda maior cidade do México, Guadalajara, que está enfrentando um grave problema no campo.

Palavras-Chave: *Análise organizacional, gestão de resíduos urbanos, estudo de caso, teoria da organização, México.*

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INTRODUCTION

The Integrated Waste Management Unit (IWMU) of the Municipality of Guadalajara (state of Jalisco, Mexico) was recently created to manage the urban solid waste programs of the city, which is the second largest in the country. However, the unit does not have the capacity to meet its goals and presents a history of poor results. Given the importance of the subject, the current situation of the IWMU, and the lack of organizational studies in urban solid waste (USW) management, this study seeks to help understand the management of these integrated waste management units. This research fills a knowledge gap on this issue and offers recommendations supported by evidence obtained with a solid methodology.

This article has six sections, including this introduction. The second section presents a literature review showing that academia has neglected USW management's organizational and administrative dimension, contrasting with the global trends and importance of the issue. The third section introduces the theoretical framework and the methodological strategy supporting the case study, which is presented in the fourth section that discusses the unit's general context and history. The fifth section presents the study's relevant results in each of the organizational dimensions of the IWMU, followed by the conclusions considering the holistic methodology and offering recommendations to the unit's administrators and also to improve the management of other units in the same situation.

LITERATURE REVIEW

The transition towards a society that generates zero waste requires changes in governments such as changes in the governance of USW (Gutberlet, 2016; Gutberlet et al., 2017), which does not replace the role of the governments' organizational capacities (Gault, 2015; López, 2011; Mendoza, 2004; Villanueva, 2011, 2013, 2014). The literature reviewed confirms the dissociation between the governance of USW and its administration and management. In addition to such a gap, a search on Jstor considering the period from 2015 to date using the keywords of this article resulted in only about twenty studies published in relevant journals.

Underdeveloped countries usually present inadequate USW management due to the distance between public administration and society (Torrente-Velásquez, Chifari, Ripa, & Giampietro, 2020; Zohoori & Ghani, 2017). Also, their USW management systems do not recognize organizational problems such as high operating costs, poorly elaborated goals (Poletto, Mori, Schneider, & Zattera, 2016), or the difficulties in monitoring and supervising the cities' performance (Kabera, Wilson, & Nishimwe, 2019). Thus, the applicability of USW management loses space in the public agenda and becomes a secondary issue (Ak & Braida, 2015). It is worth mentioning that the governmental organizations in charge of USW are more dedicated to the issue than politicians and civil society organizations (Chu, Wu, He, Zhuang, & Wang, 2019).

Another organizational problem is the insufficient coverage of services of collection and treatment of USW (Alfaia, Costa, & Campos, 2017). According to Bernache, "coverage" is an

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indicator of the percentage of users served by municipal collection systems (Bernache, 2015). Insufficient services occur because the organizations that manage the USW have practices that collide with each other, which is a challenge in sustainable waste management to be addressed through staff training (Ali, Wang, Chaudhry, & Geng, 2017). Even in contexts with consolidated solid waste management systems, such as those in the European Union, gaps challenge subnational governments' administrative capacities (Scheinberg et al., 2016).

The concept of institutional path dependence indicates the options for reforming municipal solid waste management systems, even against extreme liberalization policies (Kørnøv, Hill, Busck, & Løkke, 2016). The administrative component leads to perverse effects on the service, deepening previous inequalities (Ferronato et al., 2018). We do not find uniform local administrations in all countries. Each situation requires a contingent scheme. However, the constant elements in its effectiveness are the political and financial support and a solid administrative capacity to offer the service (Wilson et al., 2017).

According to Wilson, Rodic, Scheinberg, Velis, and Alabaster (2012), understanding specific cases facilitates the success of indigenous models; reliable information on policies, governance, technologies, and the strengths of each case, enables the adoption of appropriate solutions. Differently, not having such information represents a problem for USW management, jeopardizing the achievement of more ambitious goals, such as offering infrastructure (Daskal, Ayalon, & Shechter, 2018).

In some cases, the adoption of cost-effective strategies makes USW management difficult due to this same lack of information (Jaunich, Levis, Decarolis, Barlaz, & Ranjithan, 2019). Thus, systems analysis becomes a well-used tool in municipal solid waste management, and these systems' organizational dimensions stand out, considering their relevance in decision-making (Klang, Vikman, & Brattebø, 2006).

International experience suggests that the USW's social and economic factors, its administration, and the organization of its managerial systems affect the performance of the waste cycle (Razavian, Khosmanesh, & Izadyar, 2016). At the same time, administrative efficiency is an attribute of a robust USW management system (Hasome, Tachio, Yokota, & Nitta, 2001). In some cases, an improvement in the processes of obtaining permission and licenses would facilitate the adoption of innovative solid waste management schemes (Saadeh, Al-Khatib, & Kontogianni, 2019). According to Yeh, Chang, and Liu (2016), organizational learning positively affects USW. Evidence shows that the challenges towards optimization in waste management necessarily refer to local organizational systems. In this sense, understanding the organizational and institutional dimensions of the administration in charge is essential (Zaman & Lehmann, 2011). Proposals for innovations in USW management include the design and improvement of organizations, whether public, private, or hybrid (public and private) institutions (Chen, Luo, Yang, Liu, & Ma, 2018).

Governments have taken administrative measures to increase recycling and reuse. Regardless of their success, the expansion of administrative and organizational best practices leads to sustainable management. Also, the rationalization of the central activities of organizations

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dedicated to waste management is a crucial element (Alves & Farina, 2018), and explaining their processes and results will help develop this theme (Gallini, 2016). In this respect, the global experience should not leave local administrations behind since they focus on management's cultural, educational, and political factors – which is a gap in the study of USW management.

The problem of urban solid waste in Guadalajara

Mexico is one of the largest waste producers in Latin America. The mass of waste generated is expected to keep growing, and the estimate is to reach 671,000 tons of USW per day by 2050 (Organización de las Naciones Unidas [ONU], 2018). Waste production is considered a public health issue worldwide, with a direct environmental impact.

According to data from the Mexican National Institute of Statistics and Geography (Inegi), the country collects 86,343 tons of garbage every day (Inegi, 2019), produced mainly in homes, buildings, streets, parks, and gardens (Semarnat, 2016). In Guadalajara, each person produces 1.2 kg of waste per day (Gobierno de Guadalajara, 2019), and the response to this environmental pressure is the responsibility of the local government. Therefore, the local public administration has to think of strategies to improve the effectiveness of the waste management programs and the organizations operating them.

According to interviews conducted for the case study presented in this article, the main organizational problems of USW in Guadalajara occur due to failures in the implementation of programs focused on waste separation, recycling, and reduction, poor management of sanitary landfills, and the lack of supervision of the licensed organizations in charge of waste management. For the interviewees, the poor results of the local government's actions to improve USW separation, recycling, and reduction have been accumulating over time.

The implementation of programs to reduce USW started in 2008, with the creation of the Mexican waste separation standard, NAE-SEMADES-007/2008, establishing the mandatory separation, classification, selective collection, and waste valorization in the state of Jalisco, Mexico (Gobierno de Jalisco, 2008). The municipality of Guadalajara adapted the USW program by requesting the population to separate waste and offering selective collection on specific days (Bernache, 2019). These measures presented poor results due to inefficiencies of the local government and the inability to oversee the work of the organization responsible for waste collection, which delivered the material without separating it.

Later, in 2010, the program *Papeleras Inteligentes* (intelligent trash cans) was started (Ortiz & Carapia, 2015), managed by the company Plastic Omnium (El Informador, 2011). However, the trash cans did not measure the level of waste and were always full of unsorted material. Also, because they were placed by the side of the light posts, people used the containers to dispose of their household waste.

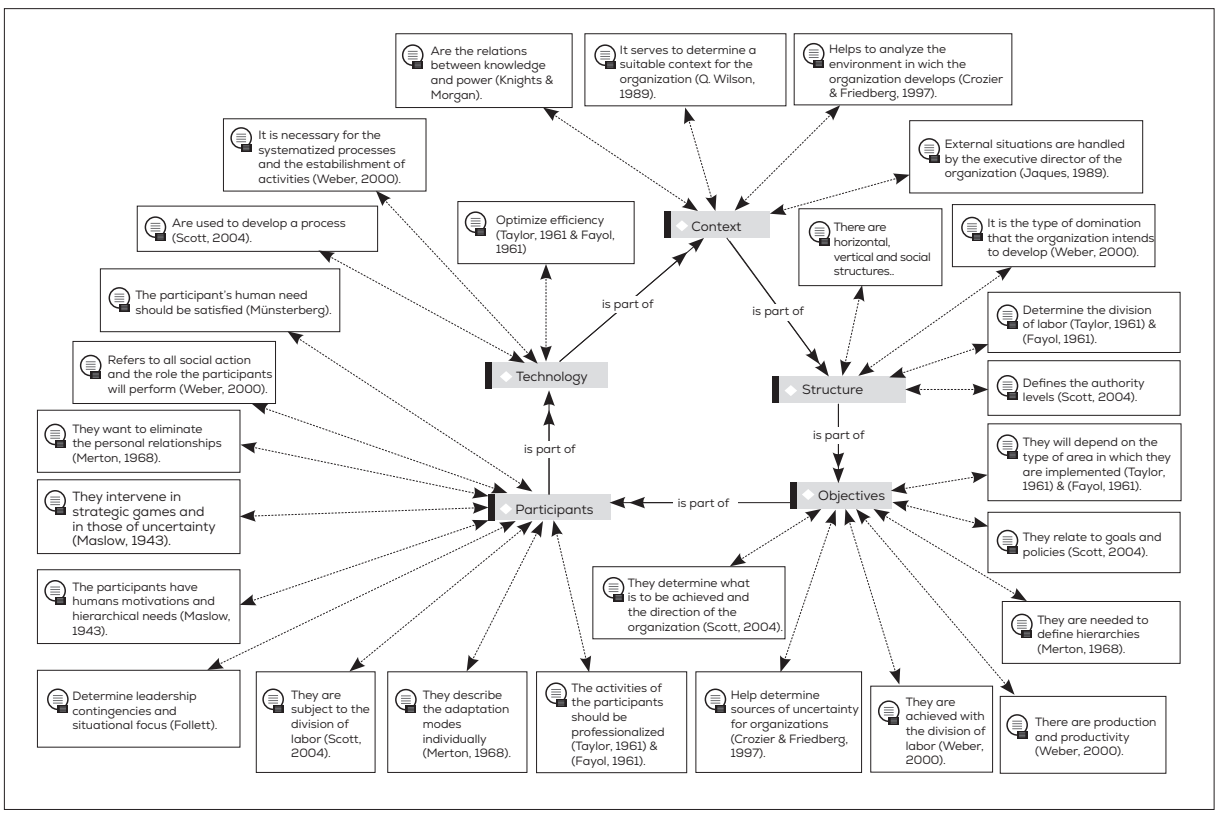
Two years after the program *Papeleras Inteligentes*, several pilot programs were carried out to promote the separation of waste in the municipality of Guadalajara (Gobierno de Guadalajara, 2011), such as programs on handling batteries, cooking oils, pots, and furniture. Another program

carried out in the city, also unsuccessfully, was the program for selective collection of solid household waste (Gobierno de Guadalajara, 2015). The last important municipal action was the program *Yo Lipio, Guadalajara Limpia* (I clean, Guadalajara gets clean), started in 2016. It consists of three axes: 1) dignified urban image; 2) new model of waste management; and 3) cleaning and care. Nevertheless, this program also did not present the expected results regarding USW reduction, separation, recycling, and reuse.

THEORETICAL FRAMEWORK AND METHODOLOGICAL STRATEGY OF THE ORGANIZATIONAL ANALYSIS

The theoretical framework proposed by Scott (2003) has the advantage of integrating the most relevant aspects that characterize any organization. An organization is a social structure created by individuals to achieve specific goals that can only be achieved collectively. This definition refers to the elements Scott introduced: participants, structure, context, technology, and goals. The discussion in this study led to a conceptual map (Figure 1) encompassing these elements and unfolding them towards a level of operationalization fit for the research.

Figure 1. Correlation among goals, structure, technologies, participants and context



Source: Elaborated by the authors based on the scholars mentioned in the map

This work combines the perspective of W. Richard Scott (1995, 2003) and the integrative methodological strategy that organizational analysts from Mexico and Colombia have developed, the critical path for strategic analysis of organizations (CP) (Morales, 2011; Morales & Castellanos, 2014; Quiñonez, Morales, & Ortega, 2017). Scott's model considers organizations as a whole, encompassing five elements related to each other: participants, goals, structure, technology, and institutional context. For the author, a comprehensive view of the organization is obtained when explaining the relationship of each element with the others.

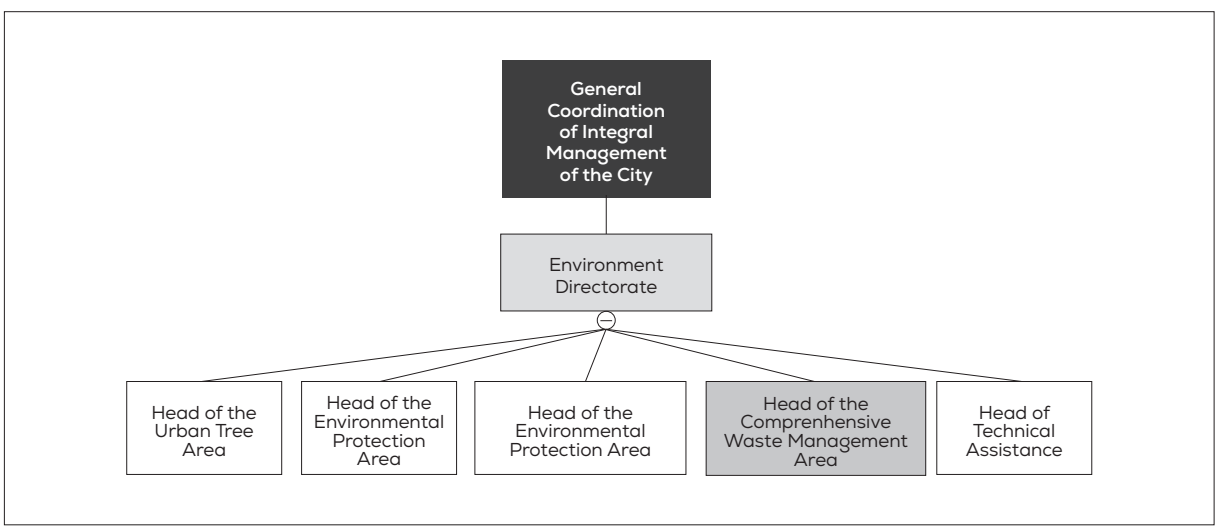
Methodological strategy

This study's methodological strategy complements the robust theoretical framework presented above. It consisted of six steps: I) delineating the theoretical contributions from Scott; II) retrieving the CP and designing the variables and indicators; III) elaborating the research instrument (interview with key participants and questionnaires – the instruments were validated through a pilot test); IV) problematization of the organization analyzed in the case study; V) application of the analysis instrument; and VI) systematization and presentation of results. The method adopted was a mixed case study, with fieldwork to collect data using semi-structured interviews.

CASE STUDY: INTEGRATED WASTE MANAGEMENT UNIT IN GUADALAJARA

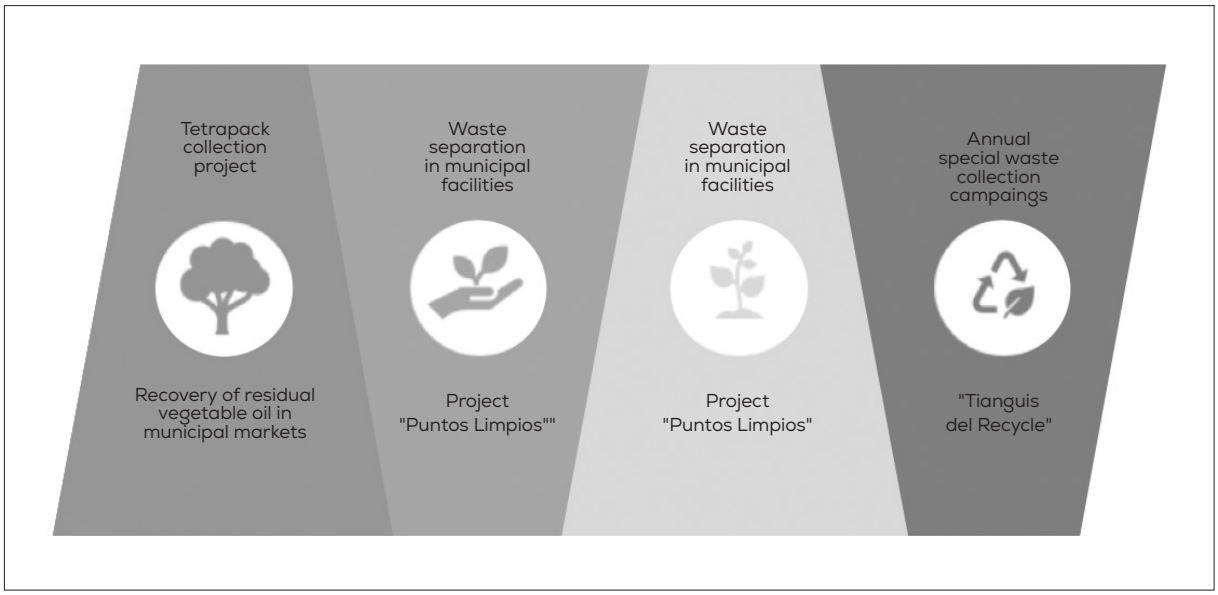
The General Coordination of the Municipality Integrated Management is in charge of the Municipality' Environmental Office, which is responsible for the departments of urban forests, environmental protection, climate change, technical support, and integrated waste management, the latter being the object of the study. Figure 2 presents the organization chart.

Figure 2. Organization chart of the General Coordination of the Municipality Integrated Management



Source: Elaborated by the authors based on data from the government of Guadalajara (Gobierno de Guadalajara, 2018).

Figure 3. Actividades que realiza la Unidad de Gestión Integral de Residuos en la ciudad de Guadalajara



Source: elaborated by the authors based on the interview with the person responsible for the IWMU.

The main activity of the Integrated Waste Management Unit (IWMU) is to design policies to reduce the amount of urban solid waste (USW) disposed of in landfills. This activity is carried out through programs such as Puntos Limpios (waste collection points), glass collection, Tianguis del Recycle, among others (Figure 3).

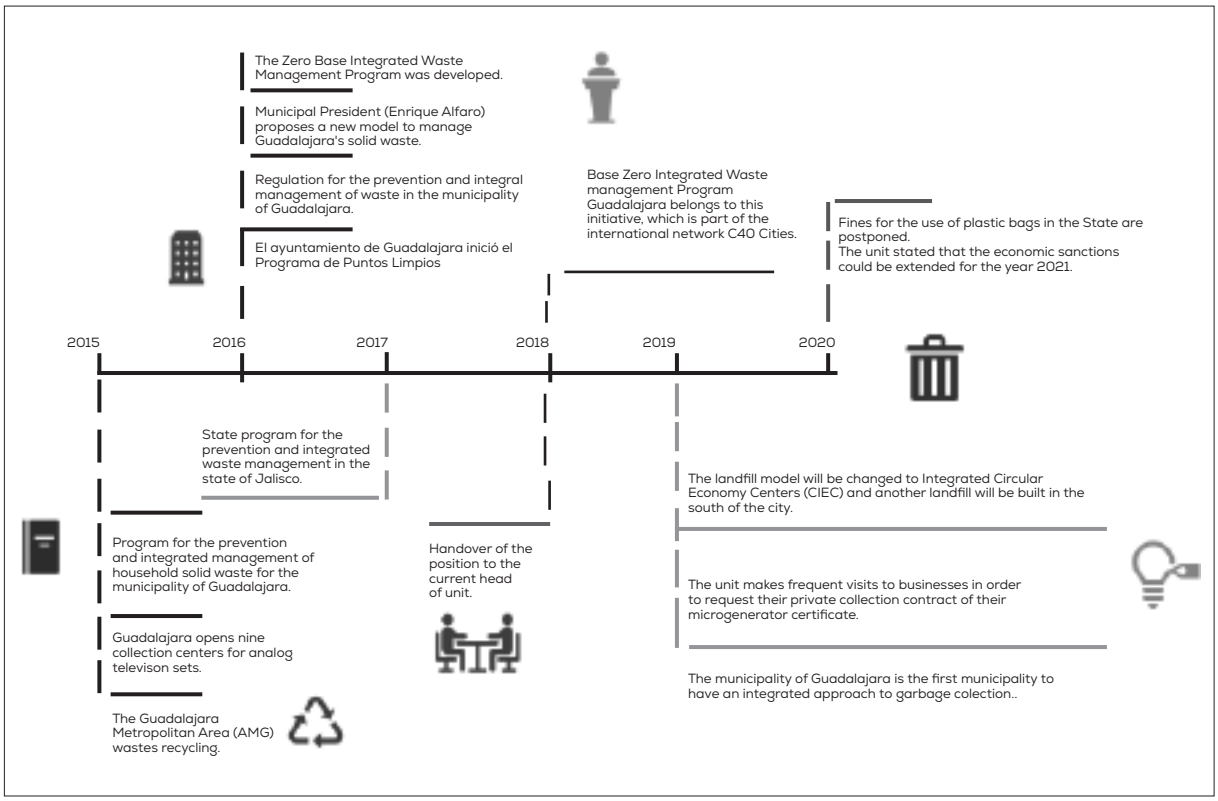
The IWMU is located in the facilities of the Municipality's Environmental Office (Av. Miguel Hidalgo 426 in Guadalajara, Jalisco, Mexico).

History of the integrated waste management unit

According to the person responsible for the unit, the IWMU was established at the end of 2015. Documents of the organization state its purpose of: "… developing programs, projects, and studies that contribute to reducing, reusing, recycling and offering correct disposal of the USW of the Guadalajara Metropolitan Area, in collaboration with other public and private institutions" (Gobierno de Guadalajara, 2018, p. 69, our translation).

Figure 4 shows the timeline with the IWMU's milestones. There is a mismatch between the creation date according to the institution's owner and its official documents (the documents stated the establishment in 2016). In 2017, the Programa Estatal para la Prevención y Gestión Integral de Residuos del Estado de Jalisco (program for integrated waste prevention and management of the state of Jalisco) was created. In 2018, the municipality of Guadalajara joined the Programa de Gestión Integral de Residuos Base Cero (a zero-based integrated waste management program) under the responsibility of the IWMU.

Figure 4. Timeline



Source: Elaborated by the authors based on research data

Exhibit 1 describes the most important events and changes regarding the management of the IWMU from 2015 to 2018.

Exhibit 1. Description of the important events and changes that influenced the IWMU

Period	Description of the change
2015	In that year, 585 tons of garbage were accumulated per day, composed solely of plastics. This amount corresponded to 10% of the total USW generated per day in Guadalajara Metropolitan Area. Using waste separation and recycling, the global mass of waste in the sanitary landfills would reduce, and the recyclable waste would valorize as raw material. As this process did not occur in the state of Jalisco, the recyclable waste went to landfills as garbage (Informador, 2015).
2016	For the second time and due to the same irregularity, Guadalajara's official sanitary landfill (called Los Laureles) operated by the company CAABSA EAGLE, was partially closed by the State Attorney for Environmental Protection. Despite this background, the mayor Enrique Alfaro Ramírez, decided to grant the operation of the household garbage collection service in Guadalajara and the administration of Los Laureles to CAABSA EAGLE for another 15 years (Meléndez, 2016). In this period, there was a setback in this area with a reported increase in solid waste generated daily per inhabitant (Respetable, 2016).
2017	The lack of coordination by municipal and state authorities to define a public policy regarding waste separation in the Guadalajara Metropolitan Area has affected the city, after years of negligence and lack of political will (Indigo, 2017).
2018	The company CAABSA EAGLE and the Government of Guadalajara were accused of irregularities. Roberto Delgadillo denounced that the local government (Ramirez administration) sold land to CAABSA EAGLE at a price lower than its value. It was located in Gobernador Curiel and Avenida 18 de Marzo; the company intended to use the property as a waste transfer station. However, the inhabitants in that area would be put at environmental risk (Respetable E. , 2018).

Source: Elaborated by the authors based on data collected from newspapers.

The administration of Mayor Enrique Alfaro Ramirez ended in 2017, and his successor Ismael del Toro Castro continued the waste management policies without making fundamental changes to the program and the management unit. This continuity may be explained by the friendship between the current and the former mayors (Ramirez is the current governor of Jalisco), who belong to the same political party.

RESULTS OF THE STUDY ON THE INTEGRATED WASTE MANAGEMENT UNIT

The results are presented below based on the elements characterizing the organizations (goals, structure, participants, technology, and context) discussed in this article. They are organized according to the type of participant.

Organizational goals

From the perspective of the participants who worked in the organization's top positions, an interviewee declared: "Consolidating an integrated waste management model that minimizes the environmental impacts caused by urban solid waste, optimizes its management economically, and responds to the needs of citizens with sustainability and order criteria" (Marín, 2020, our translation).

In addition, the same interviewee indicated particular goals: building a culture of operating according to the law, increasing storage capacity, reducing waste taken to sanitary landfills, reintegrating the waste into the circular economy value chain, increasing the citizens' co-responsibility regarding waste generation and management, and adopting a culture of order and productivity when handling waste.

Because of the responsibility inherent to the position, the interviewee in charge of the studied IWMU had clear goals guiding her leadership role. She reported three of them: 1) creating a pleasant work environment; 2) promoting team integration; and 3) considering each participant contribution valuable. It is possible to say that her daily activities were guided toward these goals, showing behavior of simple selection (Simon, 1976). The interviewee observed these goals throughout the activities at the IWMU, and she defined them herself (no manual or guidelines established these goals formally).

The general goal found in the organization's manual (Government of Guadalajara, 2018, p. 69) states what the Integrated Waste Management Area must do: "… developing programs, projects, and studies that contribute to reducing, reusing, recycling and offering correct disposal of the USW of the Guadalajara Metropolitan Area, in collaboration with other public and private institutions." It is the organization's only manual, available on Guadalajara's local government website. The interviewees demonstrated to be unaware of the available manual. Some of them actually declared not having such a document with the organization's guidelines.

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The person in charge of the Citizen Outreach Department mentioned that "this administration is creating the manuals to standardize the processes for the future." The interviewee working in the position of process support mentioned a goal of "strengthening planning and management of actions, campaigns, and strategies that promote the culture of caring for the environment, the co-responsibility of citizens with the surrounding environment, and waste valorization of 15% by 2021" (Jaramillo, 2020).

The research clearly demonstrates the absence of a relationship among general goals, administration units, and the personnel in leading positions. Even though the interviewees declared to have received training, none were aware of the IWMU's goals, objectives, and policies.

The person in charge of the Technical Department declared that the goal was to create policies to reduce waste in sanitary landfills, establish guidelines for compliance with environmental regulations, and promote environmental care among citizens. The person in charge of Process Support maintains that the goals of the organization are the development of the municipality's organic waste management and treatment strategy, optimize the USW separation and valorization, control the waste taken to the municipal landfill, disseminate the culture of recycling, strengthening and updating municipal regulations, and integrate neighborhood projects to the Zero-Base Integrated Waste Management Program. The person in charge of the Citizen Outreach Department did not respond to the interviews and questionnaires. This shows the fragmentation and displacement of the IWMU's goals and objectives.

Based on the information gathered during the research, the IWMU current products and goals are: 1) separate waste; 2) collect 500 tons of glass; 3) conduct educational programs; 4) collect 100 tons of waste in the *Puntos Limpios*; 5) Separate and collect 3 tons of waste in government offices; 6) collect 500 tons at the Tianguis del Recycle (recycling fairs); 7) collect 50 tons of tetrapak; 8) collect 5 tons of waste in public events; 9) collect 5 tons of cooking oil; and 10) collect 3,500 tons of trees. All participants agree to comply with them, but they do not agree on how to do it. There is evidence of an "individual adaptation of ritualism" since the same goals from the past administration continue to be applied, and innovation lies in the method used (Merton, 2013), which leads us to problematize the power within the IWMU.

Distribution of power in the integrated waste management unit

This case study adopted the concept of power developed by Crozier and Friedberg (1990), where the inequality relations around the control of the sources of uncertainty indicate the correlation of forces in the organizations.

The first source of uncertainty refers to regulations, represented by two mechanisms: budget control and the absence of operating manuals. Regarding the budget allocated to the IWMU, participants pointed out that every decision was restricted to the available resources, leading them to adapt to contingent variations and consequent uncertainty, annoyance, and dissatisfaction.

As for the absence of operating manuals, the IWMU did not formally assign responsibilities, rights, and processes. These elements arise from the context and the top management's interpretation of the documents *Código Urbano* (urban norms) and *Manual de Organización*

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(organization manual) of the General Coordination of the Municipality Integrated Management – the higher hierarchical entity. The unwritten rules of the Mexican bureaucracies were applied since the previous administration (from the same political party) engaged in implicit agreements that left no room for a redesign. In addition, the operational staff was part of the previous mayor's personnel (the former mayor Ramirez is currently the governor of the State of Jalisco), while the strategic leadership was formed of personnel appointed by the new local government.

The second source of uncertainties refers to technical expertise. The current leadership is trained in environmental issues but does not have expertise in urban waste management, demanding continuous support to lead the program's operation. On the other hand, the personnel remaining from the previous administration have managerial experience in the field, which causes conflict between what the leadership wants to do and what is actually done. This leads to the third source of uncertainty detected, the control of the external environment: the current governor of Jalisco (former mayor of Guadalajara) has political control over a large part of the municipality's top management. Thus, managers that were not appointed by the current mayor and remained from the previous administration depend on the former mayor's influence to manage relationships with key entities for the fulfillment of goals such as the Congress of the State of Jalisco or the State of Jalisco's secretariats of finance or public works.

The consequence of such strategic dynamics is a deep ambiguity in the USW management and policies definition. On the one hand, the interviewee from the Technical Department indicates "Adherence to current municipal, state, and national regulations on environmental issues, based on four main pillars: 1) a culture of operating according to the law; 2) increasing storage capacity; 3) reducing waste taken to sanitary landfills; and 4) productivity when handling waste" (Ramírez, 2020). On the other hand, the interviewees from the Department of Law and Order define the policy and management of USW as "carrying out each of the activities according to the benefit of the citizens of Guadalajara based on the IWMU goals" (Luna, 2020), and "reducing the waste generated in the municipality and the environmental damages caused by poor waste disposal" (Zúñiga, 2020). These ambiguities occur concerning other aspects of goals and policies since there is no unanimity about definitions. Another inconsistency found in the research instruments was that most participants named their positions differently from what was observed in the organization's chart. It is worth mentioning that the person responsible for the IWMU was the one that named the positions.

An aspect that stands out is the absence of problems derived from the control of information among the members of the IWMU. However, ambiguity and uncertainty regarding goals, objectives, and power distribution within the unit have a perverse effect on the organizational structure.

Structure

The unit performs its functions through an adhocratic structure and presents severe design problems (Mintzberg, 1988). It is a small organization, with eighteen employees operating the programs and support tasks and separated into administrative personnel and process personnel.

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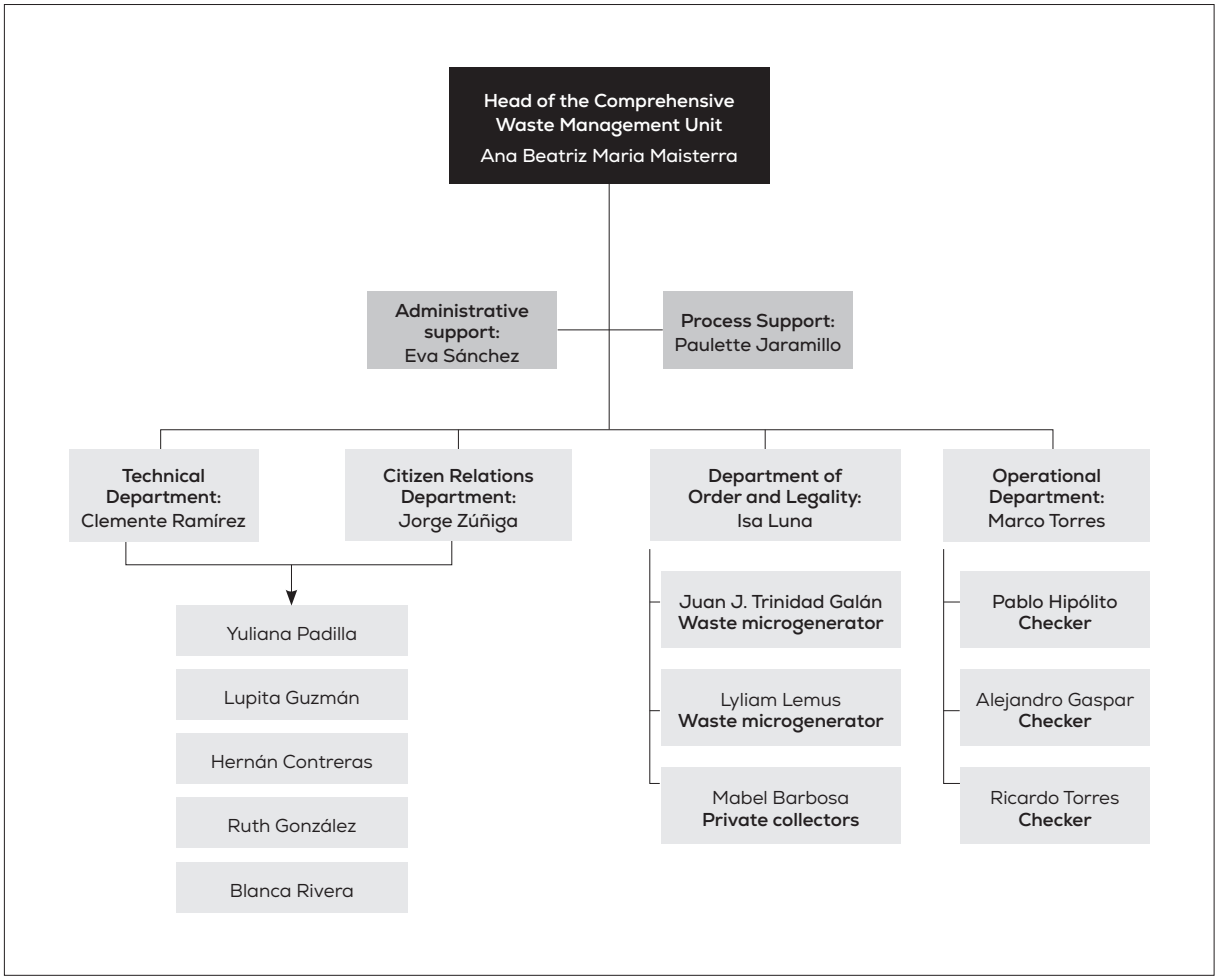
The first group carries out tasks considered central to the organization's goal. The second performs support, implementation, and operational tasks.

Figure 5. Hierarchical levels of the Integrated Waste Management Unit



Source: Elaborated by the authors based on data collected from the person responsible for the IWMU

Figure 5 presents the unit's official organization chart. There is concern about the overlapping of competencies between the Technical Department and the Citizen Outreach Department over operational personnel. The unit counts on four departments: Technical, Citizen Outreach, Law and Order, and Operations, which are in charge of young controllers and technicians overseeing waste micro-generators, most of them between 24 and 35 years old. The IWMU adopt intense and direct monitoring as a coordination mechanism. This strategy is explained by the absence of operational manuals and bureaucracy politicization (resulting in the centralization of decisions at the strategic leadership group). The degree of proximity to the Weberian bureaucracy model (Weber, 2000) is low, in agreement with the study results presented in Exhibit 2.

Exhibit 2. Analysis of characteristics of bureaucracy – Weber (2000)

Characteristics of bureaucracy	Value	Reasons
Everything in the organization is governed by rules and regulations	Low	All standards and regulations refer to the unit's external management with waste generators, but no evidence was shown, nor was there any mention of any standard or regulation that guides the IWMU internally.
Communication is very formal. Every decision is made in writing, as established in the organization's norms	Medium	There is two-way communication; external issues to the unit are verified through official documents, with the consent and approval of the unit's top management. When documents, personnel, and tools are requested from other areas, two-way communication is confirmed. Among the participants, the news of the municipality is communicated by email and other electronic means such as WhatsApp. Direct communication with the person in charge of each project is common, so they inform their subordinates.
The work (activities and tasks) is divided to achieve the goals	Medium	The work is divided when several people are contributing to the activity and when this procedure is recognized as valuable to offer the best solutions.
Hierarchy of positions and different levels of positions	High	The IWMU is a vertical organization, and the power is clearly exercised. All processes are taken to the analysis of the head of the organization and leaders of departments
Guidelines standardize procedures and activities	Low	There are no operating manuals to instruct how to carry out activities and procedures. Manuals are under construction.
People are chosen for positions according to their abilities, skills, and particular training	High	The head of the unit, and the leaders of departments, are environmental engineers.
The position assigned reflects the activity performed	Medium	The name of each job position can identify the activities performed by the staff. The score was low because the participants did not name their position exactly as formally designated in the organization chart.

Source: Elaborated by the author based on interviews

The structure of the IWMU responds to the institutionalization of decision-making as a regular process for participants (Hodgson, 1997). The set of possible options is restricted to those inherited from the previous administration. For the participants, the decisions have been refined when observing the performance of the adopted routines (Hodgson, 2006; Hodgson & Knudsen, 2004). Thus, they adopt the logic of maintaining what has been done regardless of the relevant goals.

Participants

The IWMU participants' motivation is a challenge. The routine of tasks, the politicization of the administration, and the gap between official goals and the goals declared by the bureaucrats overshadow the leadership role, leading to poor coordination and group cohesion. During a field visit, it was possible to observe a difference in attitudes of employees with more time in the organization. The head of the IWMU mentioned a desire to motivate the staff, but political

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commitments and regulations do not give her the power to work in this direction. In the six interviews, the participants indicated their motivation, determination, and commitment to carry out their work but stressed that it would be beneficial to have a manual with procedures to establish the activities clearly.

The physical environment affects the participants, who think the workspace is inadequate. They work in a warehouse adapted to an office, harming the organizational climate and, more importantly, communication.

Tables 1 and 2 show the formal and informal cross-impact matrices. The formal indicates the expected relationships based on the applicable norms, while the informal is based on the participant's perception. The divergence in these two matrices accounts for the weight of leadership and cohesion. The strategic leadership is farther from the operational base than expected, giving rise to the emergence of informal groups that, according to the evidence, reinforce the presence of ritualism, low motivation, displacement of goals and objectives, and high politicization.

Table 1. Formal cross-impact matrix

Participant	(Head)	(PS)	(TD)	(COD)	(DLO)	Total
(Head)		3	2	1	0	6
(SP)	3		0	0	0	3
(DT)	2	0		0	0	2
(DVC)	1	0	0		0	1
(DOL)	0	0	0	0		0
Participant	6	3	2	1	0	Total

Source: Elaborated by the authors, based on regulations

Table 2. Informal cross-impact matrix

Participant	(Head)	(PS)	(TD)	(COD)	(DLO)	Total
(Head)		0	1	1	0	2
(SP)	0		0	0	0	0
(DT)	1	0		3	0	4
(DVC)	1	0	3		0	4
(DOL)	0	0	0	0		0
Participant	2	0	4	4	0	Total

Source: Elaborated by the authors, based on interviews

Technology

Technology is the dominant force in the organizations' structure. It implies knowledge applied to decision-making (Child, 1972; Hanappi & Scholz-Waeckerle, 2015; Nelson & Winter, 1982; Scott, 2003). These technologies can be understood as central tasks (Wilson, 1989). They are those requiring more time from participants and are considered more interesting. The central tasks of the IWMU are shown in Exhibit 3.

Exhibit 3. Central tasks of the Integrated Waste Management Unit

Participant	Central tasks
Head of the Unit	Design and implementation of public policies focused on the management of USW
Technical support B Process Support	Environmental Education Program Logistics and support in recreational activities for society Development of projects with continuous improvement of the production process to reduce waste
Manager of projects' technical control Technical Department	Evaluation, monitoring, diagnoses, and technical studies of waste generation and composition: trash cans, *Puntos Limpios*, tetrapak, glass, *Tianguis del Recycle*, oil, public events, annual Christmas tree collection campaign, waste separation in public offices. Determining points to place containers that facilitate waste collection Management of events or activities in which the IWMU may be present. Prepare information sheets and reports, updated with the information of each project.
Assistant C Citizen Outreach Department	Dissemination of *Puntos Limpios* Environmental education Zero-waste public events
Leader of Department Department of Law and Order	Control of the IWMU's concentrated information and generation of indicators Completing the matrix with indicators of results Taking the procedures to the online environment Optimization of procedures Response to requests for transparency Releasing opinions on *Puntos Limpios* with containers to collect separated waste. Preparation of updated information sheets and reports on the opinions released about Puntos Limpios in real estate developments; standards applied to private collectors; operators Culture of operating according to the law

Source: Elaborated by the authors based on interviews

Participants consider secondary tasks to (1) strengthen and update the municipal regulations on integrated waste management; (2) apply a dissemination strategy to educate on waste separation and management; (3) integrate neighborhood projects as an area of activity of the *Programa de Gestión Integral de Residuos Base Cero*; (4) promote campaigns to collect hazardous waste, preventing this material from reaching sanitary landfill; (5) release opinions on solicitations from waste microgenerator and *Puntos Limpios* (waste collection points); and (6) promote zero-waste public events and waste separation in public offices.

The different importance given to the tasks suggests, based on Wilson, two dimensions: benefits and results. Benefits correspond to whether the task is materially observable. The task results imply that the participants are sure that their activities contribute to the stated goals. Table 3 shows the results of this evaluation.

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Table 3. Tasks according to income and results

Tasks	Benefits	Results
Central tasks		
(1)	+	-
(2)	+	-
(3)	+	-
(4)	-	-
(5)	-	
Secondary tasks		
(1)	-	-
(2)	+	-
(3)	+	-
(4)	-	-
(5)	+	+
(6)	-	-

Source: Elaborated by the authors based on interviews

This situation explains the difficulties inherent to the management of the IWMU. The organization's tasks are recognized, but it is not clear whether these tasks contribute to achieving the goals and objectives.

Context

The strategic context of the organization is relatively stable. The institution's regulatory entities are the General Coordination of the Municipality Integrated Management and the Municipality's Environmental Office. The interviewees also recognized the political influence of Jalisco's state government, considering it another regulatory entity. However, they do not identify any other instance responsible for the issue since the organization's relevant authority is the legal mandate.

The municipality's administrative units provide supplies for the IWMU operation, adopting the logic of budgeted compensation or in-kind allocations. Participants also identified private companies as suppliers since the unit outsources the service of collecting and transporting USW to these enterprises. The most dynamic relationships are concentrated with clients. The clients are waste microgenerators, commercial and service establishments, and the citizens of Guadalajara.

CONCLUSION

The Integrated Waste Management Unit (IWMU) is affected by low institutionalization, reflected in aspects such as the lack of operation manuals, budget, and human resources. This condition jeopardizes the organization's performance largely because of the politicization of the administration, ambiguity of goals, and low routinization of processes, among others.

The formalization of decision-making requires determining written codes applied to the activity. This measure forces the organization to adopt clearer goals, leading to less politicized operational and leadership positions.

It is essential to establish plans with objectives and goals for each department leader within the unit, including deadlines and adequate resources. This procedure allows measuring the efficiency of the personnel, and each participant understands their role and individual impact on the organization's performance, reducing the moral hazard to the city.

It is noteworthy that the unit's efficiency depends on the availability of financial resources, human capital, government interest to connect the effects of public policies on USW with other instances of public administration, and the correct and efficient design – on the part of the unit – of USW policies. However, the unit must first count on the basic elements so it can operate efficiently with the available resources.

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AUTHOR'S CONTRIBUTION

Jessica Alejandra Toledo and Carlos Emigdio Quintero Castellanos worked on the conceptualization and theoretical-methodological approach. The theoretical review was conducted by Jessica Alejandra Toledo and Carlos Emigdio Quintero Castellanos. Data collection was coordinated by Jessica Alejandra Toledo and Carlos Emigdio Quintero Castellanos. Data analysis was performed by Jessica Alejandra Toledo and Carlos Emigdio Quintero Castellanos. Jessica Alejandra Toledo Cervantes and Carlos Emigdio Quintero Castellanos worked together in the writing and final revision of the manuscript.

ARTICLES

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ADOPTION AND DIFFUSION OF TECHNOLOGIES 4.0 BASED ON THE INNOVATIVE TRAJECTORY AND THE SCALE OF OPERATION: THE CASE OF CHILE

Adopción y difusión de las tecnologias 4.0 a partir de la trayectoria innovativa y la escala de operación: El caso de Chile

Adoção e difusão de tecnologias 4.0 baseadas na trajetória inovadora e na escala de operação: O Caso do Chile

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ABSTRACT

The factors that can explain the diffusion of 4.0 technologies in the chilean economy are analyzed. We work with companies that can be classified as "specialized suppliers" and "science-based" relevant to the analyzed technological field. The data from the Tenth National Innovation Survey carried out by the National Statistics Institute (INE, 2018) are used. A confirmatory factor analysis of the second order is performed to identify the variables that best explain the diffusion. Lisrel 8.8 software was used, making the estimations with the robust diagonal weighted least squares method (DWLS) because we work with ordinal variables. The main results show the relevance of future innovation projects and the number of workers hired by each company to stimulate technological diffusion.

Keywords: Technological diffusion processes, government policies, confirmatory factor analysis, industry 4.0, technological innovation.

RESUMEN

Se analizan los factores que pueden explicar la difusión de las tecnologías 4.0 en la economía chilena. Trabajamos con las empresas que pueden ser calificadas como "proveedoras especializadas" y "basadas en ciencias" pertinentes al campo tecnológico analizado. Se utilizan los datos de la Décima Encuesta Nacional de Innovación realizada por el Instituto Nacional de Estadística (2018). Se realiza un análisis factorial confirmatorio de segundo orden para identificar las variables que mejor explican la difusión. Se utilizó el software Lisrel 8.8 realizando las estimaciones con el método de mínimos cuadrados ponderados diagonales robustos (DWLS) debido a que se trabaja con variables ordinales. Los principales resultados dan cuenta de lo relevante de los proyectos de innovación futura y la cantidad de trabajadores contratados por cada empresa para estimular la difusión tecnológica.

Palabras Clave: *Procesos de difusión tecnológica, políticas gubernamentales, análisis factorial confirmatorio, industria 4.0, innovación tecnológica.*

RESUMO

São analisados os fatores que podem explicar a difusão de tecnologias 4.0 na economia chilena. Trabalhamos com empresas que podem ser classificadas como "fornecedores especializados" e "baseados na ciência" relevantes para o campo tecnológico analisado. São utilizados os dados da Décima Pesquisa Nacional de Inovação, realizada pelo Instituto Nacional de Estatística (2018). Uma análise fatorial confirmatória de segunda ordem é realizada para identificar as variáveis que melhor explicam a difusão. Utilizou-se o software Lisrel 8.8, realizando as estimativas com o método robusto de mínimos quadrados ponderados na diagonal (DWLS) devido ao trabalho com variáveis ordinais. Os principais resultados mostram a relevância de futuros projetos de inovação e o número de trabalhadores contratados por cada empresa para estimular a difusão tecnológica.

Palavras-Chave: *Processos tecnológicos de difusão, políticas governamentais, análise fatorial confirmatória, indústria 4.0, inovação tecnológica.*

INTRODUCTION

This article analyzes factors that can explain the diffusion of technologies 4.0. These technologies encompass the application of sensors, learning algorithms, process virtualization, the Internet of Things (IoT), and other developments that improve the profitability and flexibility of production processes.

The study explores the diffusion power of sectors linked to Industry 4.0 in the categories of specialized suppliers and science-based companies. A second-order confirmatory factor analysis was conducted, in line with the structural equation models, adopting ordinal variables and using robust diagonal weighted least squares (DWLS) as an estimation method. The research database consists of 313 Chilean companies, listed in the Tenth National Innovation Survey conducted by the Chilean National Statics Institute (2018).

The topic search conducted in April 2021 in the Web of Science core collection using first the term "Industry 4.0" and then "Chile" showed 11 studies. The themes addressed were the use of applications in the copper industry, forestry, aquaculture, environmental issues (CO2), nutrition, and manufacturing. This search did not find studies in Chile investigating factors connected with the adoption and diffusion of technologies 4.0 considering a global perspective and using structural equation models. The articles found focused on identifying barriers to the adoption of technologies in specific sectors. Therefore, to the best of my knowledge, this study fills a research gap by offering a model based on data that explains the determinants of the adoption and use of technologies 4.0.

One of the main conclusions is that the diffusion of technologies can be explained mainly by innovation rather than by the company's operation scale. The crucial variables that supported this finding were the possibility of future innovation, the capacity to innovate based on challenges perceived, the percentage of qualified employees, and the total number of employees.

EMERGENCE OF TECHNOLOGIES 4.0

Through digitizing different connections, the Fourth Industrial Revolution completely changes the configuration of value chains (Schwab, 2016; Tirole, 2017). The technologies 4.0 cross all sectors of the economy and allow for an improvement in modularity, service orientation, decision-making capacity, decentralization, virtualization, and interoperability of processes (Lasi, Fettke, Feld, Kemper & Hoffmann, 2014; Hermann, Pentek, & Otto, 2016; Lee, Bagheri, & Kao, 2015).

This technological revolution has strongly impacted employment, especially in developing countries (Nedelkoska & Quintini, 2018). Prospective studies in Western Europe (Berger, 2016) present a curve where the unemployment rate rises and, after 20 years, employment recovers and returns to the levels before the automation process. The speed of job recovery results in new companies from the relocation of new businesses, the emergence of the technological equipment industry, and the development of services based on technologies 4.0 (Berger, 2016).

In this context, Bogliacino and Pianta (2016) analyze Pavitt's taxonomies based on the review of innovation data from manufacturing and service companies in the European Union, verifying the heterogeneity of innovation models at the sectoral level. One conclusion is that public policies must focus on the categories of specialized suppliers and science-based companies, maximizing the diffusion of the technologies 4.0 emerging from these organizations to companies operating in other sectors of the economy. This diffusion may also occur via the implementation of collaboration opportunities between clients and suppliers or by connecting research centers (Lepore, Dubbini, & Micozzi, 2021).

This research studied the factors that explain the adoption and diffusion of technologies 4.0 in specialized suppliers and science-based companies (see Exhibit 1), which are fundamental to expand the benefits of Industry 4.0 to all companies of the Chilean economy.

Exhibit 1. Identification of the economic sectors

Identification of economic activity	Description of the economic activity for the sectors "science-based" and "specialized suppliers"
26	Manufacture of computers, electronic, and optical products.
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment
61	Telecommunications
72	Scientific research and development.

Source: Elaborated by the authors based on the Décima Encuesta Nacional de Innovación (2018).

In the Chilean case, technologies 4.0 are in an early stage of diffusion. The Ministry of Economy (Minecon, 2020) recently published a survey applied to 3,344 companies about the level of information and communication technologies (ICT) adoption, with emphasis on big data and radio frequency identification (RFID). Two conclusions stand out:

- There is a significant gap in the diffusion of these complex technologies concerning the average numbers of Organisation for Economic Co-operation and Development (OECD) countries. For example, 2% of Chilean companies use big data against 13% of companies in other OECD countries. As for RFID, 6% of Chilean companies use the technology, against 14% of businesses in OECD companies.

- There is a gap in the level of technology adoption according to the company size. For example, 7.2% of large companies use big data, while only 1.7% of small and medium-sized companies have adopted this technology. RFID is used in 22% of large companies and only in 4% of small and medium-sized companies.

In this scenario, public policies are essential to technologies 4.0 diffusion nationwide, reaching more small and medium companies. Currently, there is no public policy in Chile to develop and disseminate technologies 4.0 in different economic sectors. Instead, the focus is

on developing technologies 4.0 to apply sensors and monitor the mining sector and the natural resource-intensive industry (Gatica & Ramos, 2020).

It is essential to have an industrial policy that stimulates the adoption of technologies 4.0 and helps incorporate new management practices oriented to learning and developing the capacity for innovation, offering infrastructure, human capital, and strategic partnerships (Lepore et al., 2021). In this sense, public policy can:

- Solve technological infrastructure problems, build legal frameworks, and provide information security (Chauhan, Singh, & Luthra, 2021).
- Play a strategic role in facilitating innovation initiatives for this type of technology in small companies (Chege, Wang, & Suntu, 2020).
- Stimulate the creation of new business models as a way to generate jobs to boost economic development (Dean & Spoehr, 2018), and
- Promote the opening of markets with greater technological content, facilitating company emergence (Mazzucato, 2017).

This study provides information to stimulate the diffusion of these new technologies in the Chilean industry, filling a gap in the current literature.

LITERATURE REVIEW

This section presents a literature review to justify the different hypotheses of the structural equations model (Exhibit 2).

Companies with an innovative track record have greater organizational flexibility, a fundamental condition for adopting and disseminating technologies 4.0. Therefore, a business culture willing to innovate, together with a continuous improvement strategy of processes and products, facilitates the adoption of new technologies (Agostini & Filippini, 2019; Horváth & Szabo, 2019; Rojas-Córdova, Heredia-Rojas, B., & Ramírez-Correa, 2020). This promotes the generation of new business models through personalizing consumption, commercializing new algorithms that complement the production, and through more effectively operating a value network (Botha, 2019; Müller, Kiel, & Voigt, 2018).

The incorporation of technologies 4.0 demands significant financial, technological, and human resources (Arnold, Veile, & Voigt, 2018; Dalenogarea, Benitez, & Ayala, 2018; Ingaldi & Ulewicz, 2020). The leader must manage the uncertainty involved in all technical changes, breaking organizational inertias and fears (Chauhan et al., 2021). Given the scarcity of resources and high costs, companies must define feasible objectives to generate a successful digital transformation process (Kiraz, Canpolat, Özkurt, & Taşkın, 2020).

Companies with an innovative trajectory – i.e., those that innovated in the past, intend to engage in innovative projects in the future, and face fewer challenges to develop innovation – have a greater capacity to adopt and disseminate new technologies 4.0. Three hypotheses arise:

H1: There is a positive relationship between the past innovation rate and innovative capacity, increasing the technologies 4.0 diffusion power.

H2: There is a positive relationship between plans for future innovation projects and innovative capacity, which favors technologies 4.0 diffusion power.

H3: There is a positive relationship between the capacity to innovate based on perceived challenges and innovative capacity, increasing the technologies 4.0 diffusion power.

Analyses of the adoption processes of specific technologies – RFID, big data, B2B – show that qualified human capital is essential, allowing to explore, adapt, and integrate new technologies (Chege et al., 2019; Reyes & Visich, 2016; Vowles, Thirkell, & Sinha, 2011). Companies that have human resources with digital and innovative skills are more likely to adopt technologies 4.0, reducing resistance to the changes involved in this process (Agostini & Filippini, 2019; Cabrera-Sánchez & Villarejo-Ramos, 2019).

Qualified employees recognize the benefits of investing in technologies 4.0, which suggests that such technologies are more likely to be adopted in companies with this profile of employees (Prause & Günther, 2019; Reyes et al., 2016). The advantages of technologies 4.0 may be expanded as more qualified employees tend to make better use of them and gain efficiency (Fuente, Rojas, & Leiva, 2020). Thus, companies with qualified employees may be better positioned to visualize new markets and clients, which is key in deciding whether to start a digital transformation process (Kiraz et al., 2020).

Thus, companies must have skilled employees to search, recognize benefits, and implement new technologies, which leads to another three hypotheses:

H4: There is a positive relationship between the percentage of employees who hold a graduate degree and the company's innovative capacity, which favors the technologies 4.0 diffusion power.

H5: There is a positive relationship between the percentage of qualified employees and innovative capacity, which facilitates the technologies 4.0 diffusion power.

H6: There is a positive relationship between the sales variation and the innovative capacity, which contributes to the technologies 4.0 diffusion power.

Finally, the decision to invest in ICT depends on the company's size due to the high financial barriers involved (Brambilla, 2018). Large companies, especially multinationals, have fewer barriers to adopting technologies 4.0 (Horváth & Szabo, 2019). Ingaldi and Ulewicz (2020) identify that having obsolete technology makes adoption difficult, a situation more frequently observed in older companies, generating problems of compatibility and technological integration. Gatica (2018) concludes that the number of years of operation negatively affects the innovation rate, which can negatively affect the adoption of technologies 4.0. Therefore, the following hypotheses arise:

H7: There is a positive relationship between the volume of sales and a larger scale of operation of companies that disseminate technologies 4.0, increasing their diffusion power.

H8: There is a positive relationship between the total number of employees and the scale of operation of companies that disseminate technologies 4.0, increasing their diffusion power.

H9: There is a negative relationship between the years of operation of companies that disseminate technologies 4.0 and these companies' scale of operation.

METHODOLOGY

This study applied second-order confirmatory factor analysis adopted in structural equation modeling, following previous research on innovation economy analyzing technology adoption (Agostini & Filippini, 2019; Cabrera-Sánchez & Villarejo-Ramos, 2019; Chauhan et al., 2021; Chege et al., 2020; Müller et al., 2018). However, few studies specifically consider structural equation modeling and the adoption of Industry technologies 4.0 (Kiraz et al., 2020). In this sense, this research contributes to filling a gap in the literature.

The model was developed using the data available in the Chilean *Encuesta de Innovación* and worked with three latent variables:

- Innovative Capacity (Innov): the innovative force explained by the variables past innovation, future innovation, the capacity to innovate based on the perception of challenge, percentage of employees who hold a graduate degree, percentage of qualified employees, and sales variation. The working hypothesis in this research suggests a positive relationship between innovative capacity and the capacity to disseminate technologies 4.0.

- Scale of operation (scale): refers to the companies' size. The explanatory variables are the volume of sales, the total number of employees, and the company's years of operation. The working hypothesis suggests a positive relationship between the company's operation scale and its diffusion power regarding technologies 4.0.

- Diffusion power (Diffusion). This latent variable represents the capacity of specialized suppliers and science-based companies to disseminate technologies 4.0 to other sectors of the economy nationwide. According to the model, the diffusion power positively depends on the companies' capacity to innovate and scale of operation.

Figure 1 presents the latent and explanatory variables.

Figure 1. Relationship among explanatory variables of technology diffusion

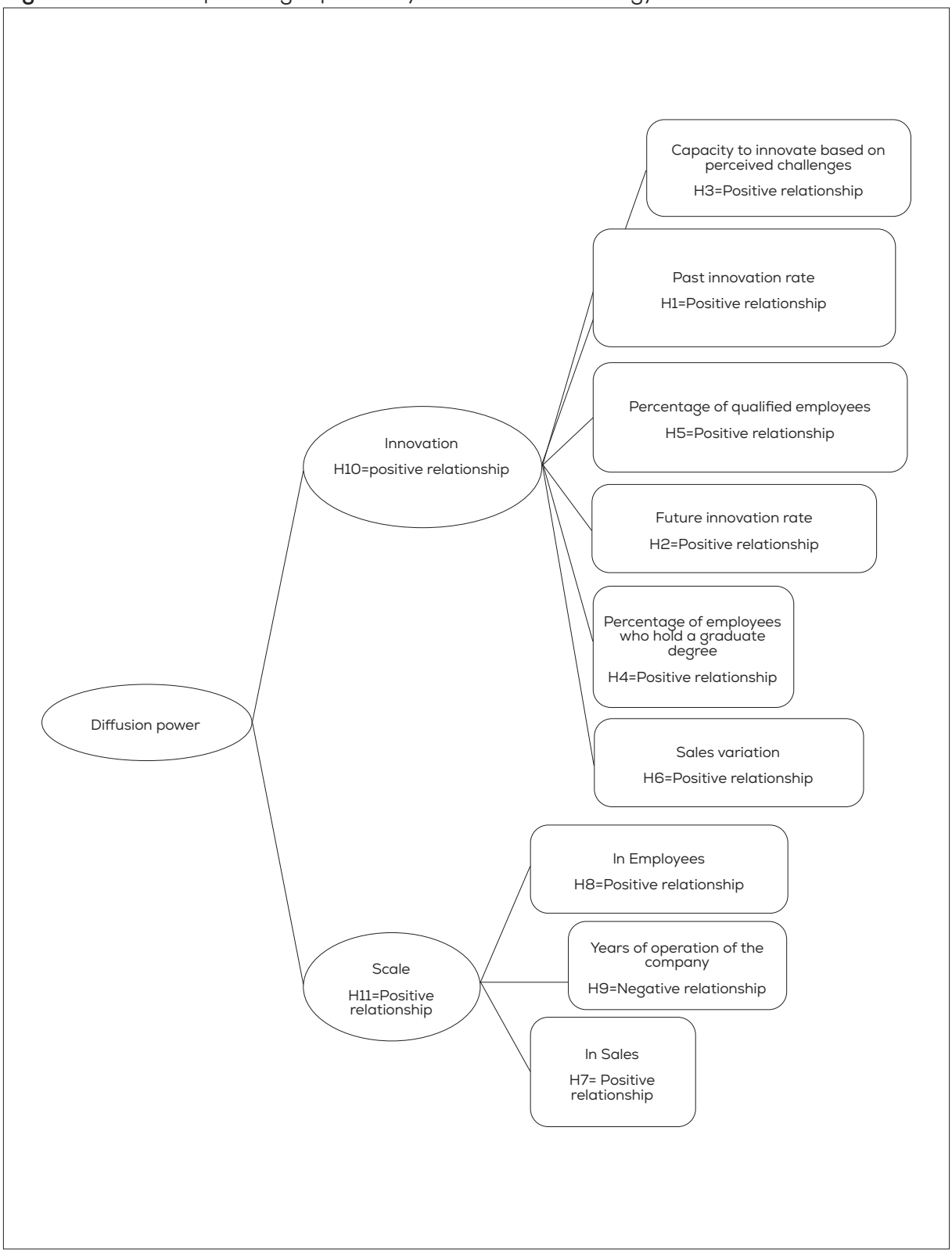

Exhibit 2 presents the explanatory variables, the metric from the information available in the *Encuesta de Innovación*, the explanation, and the expected relationship in the model based on the literature review.

Exhibit 2. Identification of the explanatory variables and formulation of the hypothetical relationship

Explanatory variable	Metric	Explanation	The hypothesis regarding the latent variable and references in the literature
Past innovation rate (Pinn)	= [Σ score by company i (New goods + New services + Improved production method + Improved logistics method + Improved support + New practices of organizational process + New methods of organizational responsibility + New methods of external organizational relations + Changes in packaging design + New means of promotion + New methods for distribution channels + New pricing methods + Social innovation) / Σ maximum score] * 100	The company that presents a higher past innovation rate is more likely to incorporate technologies 4.0 and to contribute to their diffusion	H1: Positive relationship (+) between the past innovation rate and innovative capacity Horváth et al. (2019), Chauhan et al. (2021), Müller et al. (2018), Agostini et al. (2019), Rojas-Córdova et al. (2020)
Future innovation perspective (Finn)	= Σ of future innovation present in (product + process + MKT + organizational management + social) * 100	The company with more expectations of generating innovation on different fronts of organizational development has a greater capacity to disseminate technologies 4.0	H2: Positive relationship (+) between plans for future innovation projects and innovative capacity Horváth et al. (2019), Chauhan et al. (2021), Müller et al. (2018), Agostini et al. (2019), Botha (2019)
Capacity to innovate based on perceived challenges (InnChall)	= 1- [[Σ score by company *i* (Lack of own funds + Lack of external funding + Very high cost of innovation + Lack of qualified personnel + Lack of technology information + Lack of information on markets + Difficulty finding a partner + Market dominated by established companies + Uncertainty regarding the demand for goods + Not necessary due to previous innovation + Not necessary due to lack of demand for innovation + Regulatory challenges) / Σ maximum score] * 100]	The greater the perception of innovation facilities, the greater the capacity to innovate	H3: Positive relationship (+) between the capacity to innovate based on perceived challenges and innovative capacity. Reyes et al. (2016), Arnold et al. (2018), Cabrera-Sánchez (2019), Chege et al. (2020), Horváth et al. (2019), Kiraz et al. (2020), Agostini et al. (2019)

(Continue)

Exhibit 2. Identification of the explanatory variables and formulation of the hypothetical relationship

Explanatory variable	Metric	Explanation	The hypothesis regarding the latent variable and references in the literature
Percentage of employees who hold a graduate degree (PerEmpGrad)	= [(Number of employees who hold masters or PhD degrees / Total number of employees)] * 100	Having employees who hold a graduate degree increases the probability of innovation, facilitating technological diffusion	H4: Positive relationship (+) between the percentage of employees who hold a graduate degree and innovative capacity Ingaldi et al. (2020), Dalenogarea et al. (2018), Reyes et al. (2016), Vowles et al. (2011), Chege et al (2020), Agostini et al. (2019)
Percentage of qualified employees (PerQualEmp)	= ((Number of specialized employees / Total number of employees)) * 100	Having qualified employees increases the probability of innovating	H5: Positive relationship (+) between the percentage of qualified employees and innovative capacity Ingaldi et al. (2020), Dalenogarea et al. (2018), Reyes et al. (2016), Vowles et al. (2011), Chege et al. (2020)
Sales variation (SalesVari)	= [((Sales $ 2016-sales $ 2015) / Sales $ 2015)] * 100	An increase in sales can generate an incentive to adopt technology	H6: Positive relationship (+) between the sales variation and the innovative capacity Prause et al. (2019), Reyes et al. (2016)
Sales volume (lnSales)	Natural logarithm of sales volume ($)	The larger the sales volume, the greater the diffusion effect, since the company's size facilitates technology adoption)	H7: Positive relationship (+) between the volume of sales and the scale of operation of companies that disseminate technologies 4.0 Ingaldi et al. (2020), Reyes et al. (2016), Kiraz et al. (2020
Total number of employees (lnTotEmp)	Natural logarithm of the number of employees	The larger the company, the greater its diffusion power.	H8: Positive relationship (+) between the total number of employees and the scale of operation of companies that disseminate technologies 4.0 Ingaldi et al. (2020), Reyes et al. (2016), Chege et al. (2020), Brambilla (2018)
Years of operation (CompYear)	Years of operation of the company	The number of years since the company started its operations. The lower diffusion capacity is due to difficulties in adapting to new production models	H9: Negative relationship (-) between the years of operation of companies that disseminate technologies 4.0 and these companies' scale of operation Ingaldi et al. (2020), Gatica (2018)

(Concludes)

As mentioned above, the distribution presented by the variables does not meet the assumptions of multivariate normality, and specific models for ordinal variables were adopted (Jöreskog, 1994). In addition, Pearson, polychoric, and polyserial correlation matrices were used (Table 1). The analysis adopted a diagonal weighted least squares (DWLS) robust estimation method, included in the Lisrel 8.8 system and specially designed for ordinal variables.

Table 1. Correlation matrix

	InnChall	Finn	CompYear	lnSales	SalesVari	lnTotEmp	PerEmpGrad	PerQualEmp	Pinn
InnChall	1.00								
Finn	0.01 (PS)	1.00							
CompYear	0.04 (PE)	-0.07 (PS)	1.00						
lnSales	0.19 (PS)	0.11 (PC)	0.26 (PS)	1.00					
SalesVari	0.08 (PE)	0.05 (PS)	-0.09 (PE)	0.16 (PS)	1.00				
lnTotEmp	0.14 (PS)	0.13 (PC)	0.25 (PS)	0.80 (PC)	0.09 (PS)	1.00			
PerEmpGrad	-0.02 (PE)	0.02 (PS)	-0.07 (PE)	-0.02 (PS)	0.09 (PE)	-0.06 (PS)	1.00		
PerQualEmp	0.09 (PE)	0.20 (PS)	-0.15 (PE)	-0.05 (PS)	-0.03 (PE)	-0.13 (PS)	-0.01 (PE)	1.00	
Pinn	0.20 (PS)	0.58 (PC)	-0.12 (PS)	0.23 (PC)	-0.03 (PS)	0.26 (PC)	0.06 (PS)	0.20 (PS)	1.00

Note: The type of correlation is show in brackets: PE = Pearson, PC = Polychoric, PS = Polyserial
Source: Elaborated by the authors based on Lisrel results.

Tables 3 and 5 present different criteria to measure the quality of the models. The following indices are distinguished: goodness of fit, incremental fit, and parsimony fit. Considering the large sample analyzed, the ratio between chi-square and degrees of freedom is presented (Hooper, Coughlan, & Mullen, 2008).

The analysis started with 373 companies. After eliminating incomplete and erratic data, the final sample consisted of 313 companies (83% of the original number). The study encompasses 12 variables (latent and explanatory). Therefore, there is a ratio of 26.08 companies per variable, which is above the minimum required in this type of study (15 units per variable) (Hair, Andersen, Tathan, & Black, 1999).

RESULTS

A preliminary review of data is presented here to contextualize the final results. Subsequently, the first and second models are developed.

Preliminary review of data

Table 2 presents the indicators for the type of future and past innovation and obstacles to innovation perceived by companies that diffuse technologies 4.0.

Table 2. Distribution of types of future and past innovation and challenges to innovation

		Number of companies	Percentage (313 companies)
Future innovation (a company may intend to innovate in more than one area)	Future product innovation	162	51.6%
	Future process innovation	132	42.2%
	Does not contemplate innovation in the future	115	36.6%
	Future innovation in organizational management	100	32.0%
	Future innovations in MKT	94	30.1%
	Future innovations of a social nature	40	12.6%
		Number of companies	**Percentage (313 companies)**
Past innovation (a company may have innovated in more than one area)	It does not feature past innovation	213	68.0%
	New services	49	15.6%
	New practices of process organization.	47	15.1%
	New methods of organizing responsibilities	44	14.0%
	Improve support	40	12.7%
	Improved production method	34	10.8%
	New goods	31	10.0%
	New means of promotion.	27	8.6%
	New methods of external relations	25	8.1%
	New pricing methods	23	7.3%
	New methods for distribution channels	19	6.2%
	Changes in packaging design	18	5.7%
	Improved logistics method	13	4.0%
	Social innovation	6	1.9%

(Continue)

Table 2. Distribution of types of future and past innovation and challenges to innovation

		Number of companies	Percentage (313 companies)
		Number of companies	Percentage on a 313 basis
Main barriers to innovate (a company may appoint more than one item)	High costs of innovation	128	41.0%
	Lack of own funds	127	40.7%
	Lack of external funding	101	32.3%
	A market dominated by established companies	94	30.2%
	Uncertainty regarding the demand for goods	94	30.2%
	Difficulty finding a partner	83	26.4%
	Lack of qualified personnel	68	21.8%
	Lack of technology information	53	17.0%
	Lack of market information	52	16.7%
	Regulatory barriers	40	12.9%
	Lack of demand for innovation	30	9.7%
	Innovation is not required due to previous innovations	30	9.4%

(Concludes)

Of the companies analyzed, 36.6% do not contemplate innovating in the next two years. In the distribution of the innovation types: the "product innovation" present in 51.6% of the companies, and the "process innovation" with a participation of 42.2%, stand out. With a similar weight are the innovations in "marketing" and "organizational management" – 30.1% and 32.0%, respectively. Finally, there are those of a "social nature" with 12.6%.

Regarding innovation in the previous two years, it is interesting that 68% of the companies did not innovate at all. Compared to companies that want to innovate in the future (63.3%) with those that innovated in the previous two years (32.0%), there is a problem of innovative efficiency where many companies do not innovate, even though they intend to. The innovation rate of previous years (32.0%) is above the similar national average of 23.6% (Gatica, 2019).

New services stand out among past innovations (observed in 15.6% of the companies). Process innovation appears after, observed in 15.1%, followed by changes in the form of organization (14% of companies).

The biggest obstacle observed is financial. The high cost of innovation and the lack of funds to meet requirements are present in about 41%. Similarly, 32.3% of the companies that diffuse technologies 4.0 perceive difficulty obtaining external financing.

Three factors showed a lower level of relevance regarding structural variables in the sector. Of the companies analyzed, 30.2% mentioned that established companies dominate the market, and a similar percentage believe that the uncertainty regarding the demand for new goods slows innovation.

These results show the relevance of having resources to support the risk involved in undertaking an innovation process.

First model

Table 3 presents the main indicators of goodness of fit, incremental adjustment measures, and parsimony adjustment, comparing them with the reference parameters normally used in the literature (Escobedo, Hernández, Estabané, & Martínez, 2016; Hair et al., 1999).

Table 3. The goodness of fit of the first model

Types of Settings	Statistics	Observed value First Model	Reference value	Fit quality
Goodness-of-fit Indexes	Root Mean Square Error of Approximation (RMSEA)	0.00	‹0.08	Acceptable
	Standardized RMR	0.07	‹0.7 and CFI › 0.92	Acceptable
	Root Mean Square Residual (RMR)	0.07	‹0.7 and CFI › 0.92	Acceptable
	Chi square / degrees of freedom	= (74.09/26) = 2.84	Between 2-5	Acceptable
Incremental fit Indexes	Normed Fit Index (NFI)	1.00	› 0.92	Acceptable
	Comparative Fit Index (CFI)	1.00	› 0.95	Acceptable
	Adjusted Goodness of Fit Index (AGFI)	0.96	›0.90	Acceptable
Parsimony fit -- Indexes	Parsimony Normed Fit Index (PNFI)	0.72	Between 0.5 and 0.7, considered acceptable	Out of range

Table 3 shows that the proposed model presents acceptable conditions to be analyzed. The parsimony fit is outside the accepted range. However, Newsom (2018), suggests evaluating the model independently of the parsimony fit. At the time of the analysis, the proposed model was convergent.

Figure 2. First Model

Standardized factorial loads (λn) and estimation errors (e).

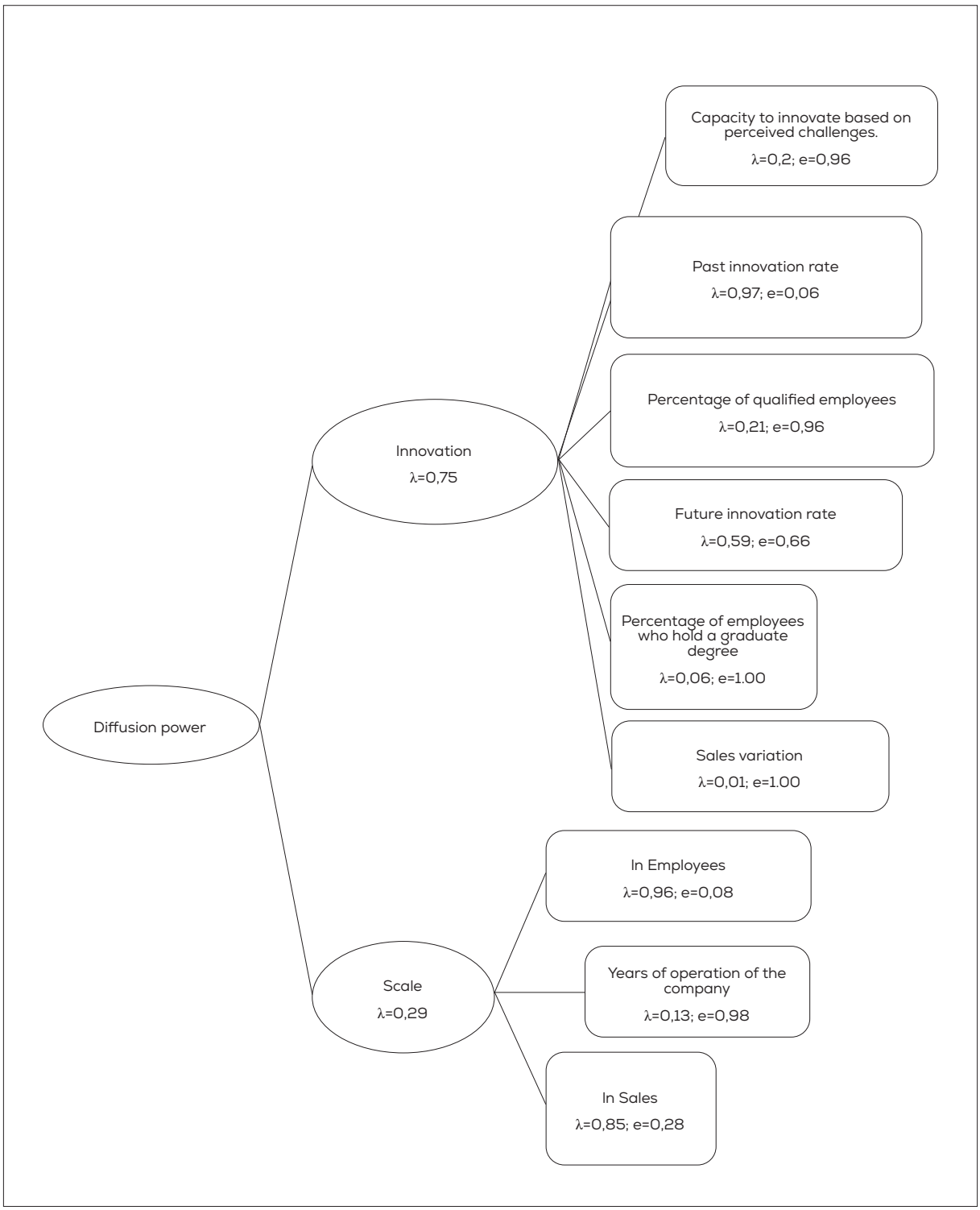

Table 4. Results of the first model, by variable

Latent variables	Explanatory variables	Estimate	Test T	Average variance extracted (AVE) (1)	Ordinal reliability coefficient (ℭ) (2)
Innovative Capacity	← Future innovation perspective (Finn)	0.60	7.65***	0.2	0.5
Innovative Capacity	← Capacity to innovate based on perceived challenges (InnChall)	0.20	4.02***		
Innovative Capacity	← Percentage of qualified employees (PerQualEmp)	0.047	0.82		
Innovative capacity	← Past innovation rate (Pinn)	0.21	4.11***		
Innovative Capacity	← ln Total number of employees (lnTotEmp)	0.0067	0.14		
Innovative Capacity	← ln Sales (lnSales)	1.00			
Scale of operation	← Years of operation (CompYear)	1.00		0.5	0.7
Scale of operation	← Innovative capacity	1.13	3.15***		
Scale of operation	← Scale of operation scale (Scale)	0.15	0.98		
Diffusion power	← Future innovation perspective (Finn)	1.00		0.38	0.4
Diffusion power	← Capacity to innovate based on perceived challenges (InnChall)	0.33	2.07**		

Discriminant validity check

	√AVE	Innovative Capacity	Scale of operation	Diffusion power
Innovative capacity	0.47		‹0.18 (3)	‹0.54 (3)
Scale of operation	0.74			›0.18
Diffusion power	0.56			

(***) 99% confidence; (**) 95% confidence and (*) 90% confidence.
Note 1 = Average variance extracted (AVE) = $[(\Sigma\lambda^2) / n]$; where n is the number of indicators.
Note 2 = Ordinal reliability coefficient (φ) = $[(\Sigma\lambda)^2 / ((\Sigma\lambda)^2 + (\Sigma 1-\lambda^2)]$
Note 3 = Low discriminant capacity of the latent variable.

Figure 2 presents the first model. The latent variables innovation and scale of operation explain the "diffusion power" (Table 4). From the standardized factorial loads (herein λ), the innovative capacity (λ = 0.75) is greater than the operation scale (λ = 0.29).

Among the explanatory variables for innovation, the percentage of employees with a graduate degree showed little significance (λ = 0.06; t = 0.82), rejecting hypothesis H4. However, the

percentage of qualified employees was found as highly explanatory of the companies' innovation capacity (λ = 0.21; t = 4.11), proving hypothesis H5 and justifying the intensive learning in the organizations.

The capacity to innovate based on challenges perceived is positively correlated with diffusion power (λ = 0.20; t = 4.02), confirming hypothesis H3. Also, the positive relationship between future innovation, innovation capacity, and, consequently, the diffusion power of the company (λ = 0.59, t = 7.65) was observed, confirming H2.

Compared to the previous year, the improvement in sales does not present a significant relationship with the innovation capacity (λ = 0.01; t = 0.14), rejecting hypothesis H6. Therefore, this factor is not relevant when analyzing a company's diffusion power.

Finally, the past innovation rate variable (λ = 0.97) was set at a unit value to run the confirmatory factor analysis. The relationship with the latent variable was positive from its factorial load, confirming hypothesis H1.

The analysis of the second latent variable demonstrated that the number of employees (λ = 0.96, t = 3.15) has a significantly positive relationship with the company's scale of operation and, therefore, with its diffusion power. This result corroborates hypothesis H8.

In this first model, there was no significative relation between the variable years of operation and the scale of operation of companies disseminating technologies 4.0 (λ = 0.13; t = 0.98), rejecting hypothesis H9.

Finally, the sales volume had a positive relationship with the scale of operation (λ = 0.85) of companies that disseminate technologies 4.0, confirming hypothesis H7. This variable was determined in a unit value to run the confirmatory factor analysis and is consistent with the model.

From this first model, it is possible to observe that the diffusion power is greater when there is: i) a more significant number of projects for innovation in the future; ii) more employees; iii) more qualified employees; iv) capacity to innovate based on perceived challenges.

Table 6 also shows the average extracted variance (AVE), the ordinal reliability coefficient (ↃↃ), and the discriminant validity (Elosua & Zumbo, 2008; McDonald & Ho, 2002; Ventura-León & Caycho-Rodríguez, 2017; Viladrich, Angulo-Brunet, & Doval, 2017). The reliability for ordinal variables (ↃↃ) was 0.5 and 0.7 for the two latent variables, which is acceptable. However, in the first model, the construct "innovative capacity" had a low discriminant capacity; in both cases, the square root of the AVE was less than the correlation of the construct.

Second model

The second model presents improvements in comparison to the first model developed. The construct "innovative capacity" was given discriminant validity, excluding variables that did not present a significant relationship in the first model (t<1.96, 95% confidence). Therefore, sales variation and the percentage of employees who hold a graduate degree were eliminated. Table 5 shows that the second model has incremental and parsimony goodness of fit, correcting the first model.

Table 5. The goodness of fit of the second model

Types of Settings	Statistics	Improved observed value	Reference value	Quality of fit.
Goodness-of-fit Indexes	Root Mean Square Error of Approximation (RMSEA)	0.00	‹0.08	Acceptable
	Standardized RMR	0.06	‹0.7 con CFI › 0.92	Acceptable
	Root Mean Square Residual (RMR)	0.06	‹0.7 con CFI › 0.92	Acceptable
	Chi square / degrees of freedom	=(41.9/12) = 3.4	Between 2-5	Acceptable
Incremental fit indices Indexes	Normed Fit Index (NFI)	1.00	About 0.92	Acceptable
	Comparative Fit Index (CFI)	1.00	About 0.95	Acceptable
	Adjusted Goodness of Fit Index (AGFI)	0.97	›0.90	Acceptable
Parsimony fit indices Indexes	Parsimony Normed Fit Index (PNFI)	0.57	Between 0.5 and 0.7 is considered acceptable	Acceptable

Figure 3. Second Model

Standardized factorial loads (λn) and estimation errors (e).

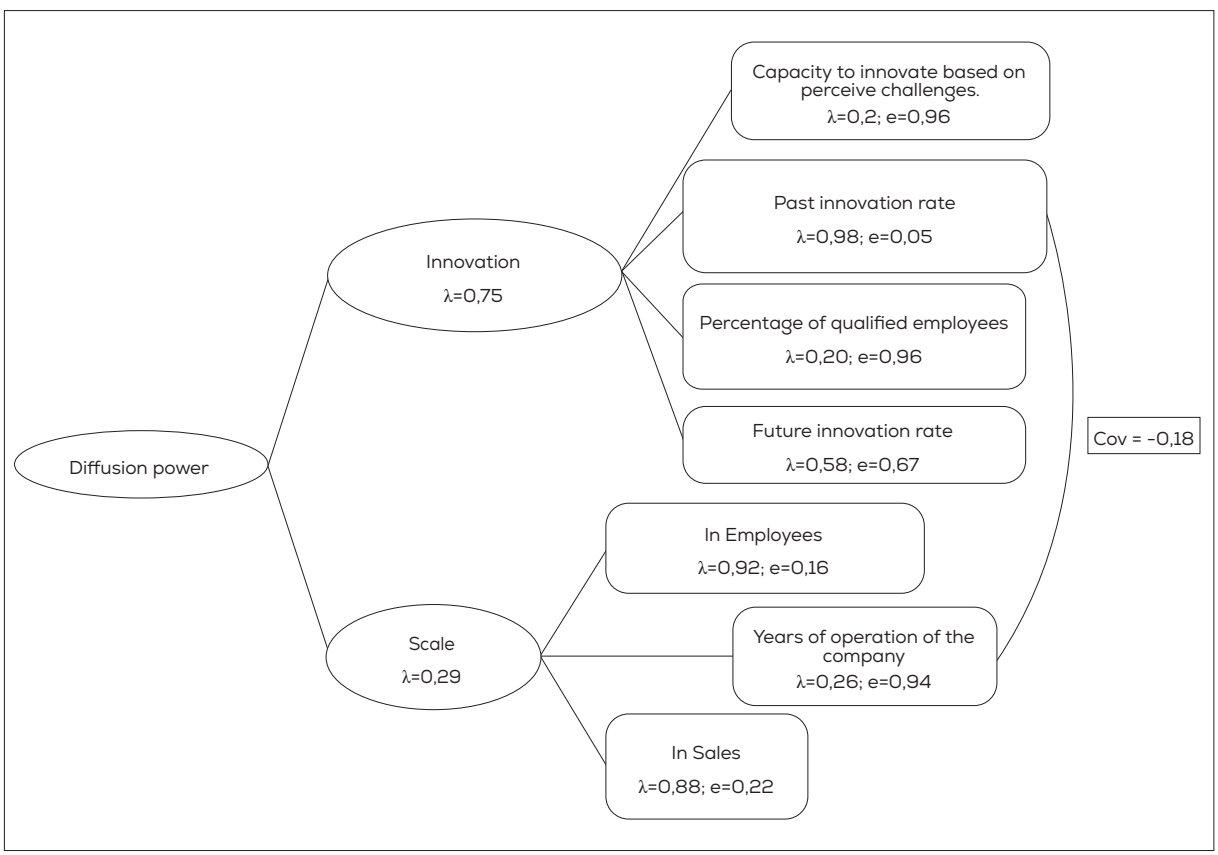

Table 6. Results of the second model, by variable

Latent variables	Explanatory variables	Estimate	Test T	Average variance extracted (AVE)(1)	Ordinal reliability coefficient (ϖ) (2)
Innovative Capacity	← Future innovation perspective (Finn)	0.59	7.56***	0,4	0.6
Innovative Capacity	← Capacity to innovate based on perceived challenges (InnChall)	0.20	3.99***		
Innovative capacity	← Percentage of qualified employees (PerQualEmp)	0.21	4.03***		
Innovative Capacity	← Past innovation rate (Pinn)	1.00			
Operation scale	← ln Total number of employees (lnTotEmp)	1.04	5.72***	0.6	0.8
Operation scale	← ln Sales (lnSales)	1.00			
Operation scale	← Years of operation (CompYear)	0.29	2.80***		
Diffusion power	← Innovative capacity	1.00		0.3	0.5
Diffusion power	← Scale of operation scale (Scale)	0.42	3.74***		

Discriminant validity check

	√AVE	Innovative capacity	Scale of operation	Diffusion power
Capacidad innovativa	0.63		› 0.21	› 0.51
Escala de operación	0.77			› 0.21
Potencia difusora	0.56			

(***) 99% confidence; (**) 95% confidence and (*) 90% confidence.

Note 1 = Average variance extracted (AVE) = [(Σλ²) / n]; where *n* is the number of indicators.

Note 2 = Ordinal reliability coefficient (ϖ) = [(Σλ) ² / ((Σλ) ² + (Σ 1-λ²)]

Figure 3 presents the model. Table 6 shows that the ordinal reliability coefficient (ϖ) was acceptable for the latent variables (between 0.6 and 0.8) in the second model. The AVE for the variable "scale" was 0.6. The "innovative capacity" was from 0.2 to 0.4, closer to the optimum of 0.5. The second model has the discriminant capacity, stating that √AVE of the latent variables is greater than their correlation.

In the second model, companies with more projects to innovate in the future have a higher probability of being innovative and, therefore, are more likely to adopt and disseminate

technologies 4.0 (λ = 0.58, t = 7.56). Regardless of perceived challenges, their capacity to innovate was λ=0.2 and t=3.99, maintaining its importance as an explanatory variable. For the variable percentage of qualified employees, the innovative and, therefore, the diffusion capacity was λ=0.2 and t=4.03.

Finally, the "past innovation rate" was λ=0.98, determined in a unit value to create the second model. This variable has a negative relationship with years of operation, crossing two latent variables. This relationship made it possible to improve the overall presentation of the model in the goodness of fit indices.

Among the variables that explain the "scale of operation," the total number of employees is relevant, presenting the highest factor load (λ = 0.92, t = 5.72). Sales (λ = 0.88), as in the first model, were determined in a unit value to generate the corresponding calculations. Different from the first model, the variable years of operation was significant for the second model. The variable years or operation was shown to impact the scale of operation and the diffusion of technologies 4.0 (λ=0.26, t=2.8).

DISCUSSION OF THE RESULTS

The analysis demonstrated that both versions of the model present consistent results. Contrary to the first assumptions, the percentage of employees who hold a graduate degree and the increase in sales were not significant to influence technologies 4.0 diffusion. Regarding the increase in sales, it would be worthwhile to monitor the revenues for each specific technology – which is beyond the scope of this research.

The model suggests that companies with projects to innovate in the future can be good diffusers of technologies 4.0, corroborating the research by Horváth and Szabo (2019) and Agostini and Filippini (2019). In this sense, greater organizational flexibility, a culture of adaptation, continuous improvement practices, and new business models are elements that contribute to incorporate and disseminate technologies 4.0, as indicated by Müller et al. (2018).

Also, it was observed that each company's capacity to innovate based on a low perception of challenges is a measure of its capacity to disseminate technologies 4.0. The innovation bottlenecks can be grouped into financing problems, incentives to the economic sector, and the availability of public resources. These findings converge with the literature, as indicated by Arnold et al. (2018), Dalenogarea et al. (2018), and Ingaldi and Ulewicz (2020). The innovation challenges limit the diffusion power and explain why companies have future projects that they do not put into practice, as demonstrated in the preliminary data review.

On the other hand, this research confirms studies such as Brambilla (2018) and Horváth and Szabo (2019) about the importance of the company's size based on the total number of employees. This topic was observed in the theoretical framework presented above, demonstrating the problem faced by developing countries – and detected in the recent *Encuesta TIC* (ICT Survey) (Minecon, 2020) – where the size of the companies leads to differences regarding the adoption of technologies 4.0.

Our model confirms that qualified employees contribute to increase innovation and diffusion power, corroborating the literature. Qualified human capital helps to find, understand, implement, and exploit new technologies 4.0, lowering the resistance to adoption.

In the second model, the variable years of operation was not significant as an explanatory variable, different from hypothesis H9, designed based on Ingaldi and Ulewicz (2020) and Gatica (2018). The years of operation of a company, when looking at its scale of operation, positively affects its capacity to disseminate technologies 4.0. In the long term, new business models should be born based on technologies 4.0 (Botha, 2019), changing the relationship between the companies' years of operation and diffusion power, which may confirm the hypothesis.

The literature review conducted in the Web of Science core collection in April 2021 demonstrated the absence of studies analyzing the dissemination of technologies 4.0 in Chile using structural equation modeling. Furthermore, as indicated by Kiraz et al. (2020), very few studies at a global level analyze the adoption of technologies 4.0 based on structural equations, limiting the opportunities to compare results.

In this context, the study by Rojas-Córdova et al. (2020), using data science tools through decision trees, concluded that in large Chilean companies, the most significant barriers affecting the intention to innovate are costs, lack of demand for innovations, and lack of qualified personnel. On the other hand, the barriers in the small and medium-sized Chilean companies are lack of own resources, lack of demand for innovations, and lack of information on technology. Although obtained using another methodology, these results are in line with this research when highlighting the importance of innovative trajectories and scales of operation to understand the adoption and diffusion of technologies 4.0.

FINAL CONSIDERATIONS

Chile is behind in the adoption of ICT when compared to the average of OECD countries. According to Chauhan et al. (2021), Dean and Spoehr (2018), and Mazzucato (2017), the country's first tasks are to solve the technological infrastructure problems, prepare the legal frameworks and guarantee and information security, and promote new business models and new technological markets to achieve national economic development. Likewise, the model developed in this study highlights the need to elaborate policies toward smaller companies since they face more difficulties in investing in technology. This measure would contribute to maximizing the diffusion power of the entire national market.

The *Encuesta TIC* (Minecon, 2020) reported that only 9% of small and medium-sized companies in Chile have access to high-speed Internet (over 100 Mbps). Nhamo, Nhemachena, and Nhamo (2020) analyzed 212 countries on this matter, concluding that low ICT capacity anticipates a slow diffusion of technologies 4.0. Thus, public policies must strategically invest in ensuring a good connection speed for companies, especially smaller ones.

Equally important is to improve the educational system nationwide. The findings obtained in this study reinforce the importance of qualified employees to improve the organizations'

capacity to adopt and disseminate technologies 4.0. In Chile, Almeida, Fernandes, and Viollaz (2020) conclude that the educational system should be reinvented to facilitate the adoption of more advanced technology. The study by Safrankova, Sikyr, and Skypalova (2020) proposes that the preparation of human capital should develop skills such as communication, problem-solving, implementation, team learning, and teamwork so that the workforce is prepared to respond to the challenges of the Fourth Industrial Revolution.

Developing countries must implement a massive training plan in digital skills for workers, including those currently employed, facilitating technology adoption and creating new companies based on technologies 4.0.

Study limitations

The limitations of this study reveal four dimensions worth addressing in future research to analyze companies' diffusion power:

- Geographic proximity. The analysis does not capture the effect of spatial proximity, which is key when promoting future clusters of 4.0 companies based on the mobility of qualified employees and the creation of new technology businesses in specific territories.

- Input-output relationships. The knowledge of the chains allows identifying the activities that are more likely to help the diffusion of technologies 4.0.

- Dynamic vision of the process. Longitudinal analysis is important to observe the dynamics of adoption, diffusion, and innovation processes around technologies 4.0 in specific territories.

- Business leadership. The literature grounded on case studies suggests that the organizational leaders' vision and commitment to adopting new technologies are relevant. Business leadership is a variable that could not be addressed in this study, but it is essential in incorporating and disseminating technologies 4.0.

Note

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AUTHOR'S CONTRIBUTION

Francisco Gatica-Neira affirms that he has participated in all stages of the development of the manuscript, which includes: conceptualization and theoretical-methodological construction, theoretical review, data collection, data analysis, writing and final review.

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ON THE MARGINS OF DIVERSITY MANAGEMENT? TRAVESTIS, TRANSSEXUALS AND THE WORLD OF WORK.

À margem da gestão da diversidade? Travestis, transexuais e o mundo do trabalho

¿Al margen de la gestión de la diversidad? Travestis, Transexuales y el mundo del trabajo

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ABSTRACT

Although research on LGBT+ diversity in Administration has gained visibility, studies about the transgender population are still scarce. This essay presents a literature review of the experiences of travestis and transsexuals at work. The analysis of the literature led to the creation of four categories of meaning: (1) the construction of trans research agenda in Administration; (2) the places and non-places of travestis and transsexuals in the world of work; (3) trans pedagogy as an organizational diversity category and (4) strategies of transgender expression in the workplace. The categories discussed in this paper indicate possible ways to consolidate a trans research agenda in Brazilian studies on organizational diversity.

Keywords: diversity, inclusion, gender identity, travestis, trans women.

RESUMO

Embora as pesquisas sobre diversidade LGBT+ tenham ganhado visibilidade na Administração, os estudos sobre a população transgênero ainda são escassos. Este trabalho apresenta uma revisão da literatura organizacional sobre as experiências de travestis e transexuais no mundo do trabalho. Foram construídas quatro categorias de significado: (1) a construção da agenda de pesquisa trans em Administração; (2) os lugares e não lugares das travestis e transexuais no mundo do trabalho; (3) a pedagogia trans como categoria da diversidade organizacional e (4) estratégias de expressão de gênero trans no ambiente de trabalho. As categorias debatidas neste trabalho sinalizam caminhos possíveis para consolidação de uma agenda de pesquisa trans nos estudos brasileiros em diversidade organizacional.

Palavras-chave: *diversidade, inclusão, identidade de gênero, travestis, mulheres trans.*

RESUMEN

Aunque las investigaciones sobre diversidad LGBT+ han ganado visibilidad en Administracion, los estudios sobre la población transgénero aún son escasos. Este trabajo presenta una revisión de la literatura organizacional sobre las experiencias de travestis y transexuales en el trabajo. Se construyeron cuatro categorías de significado: (1) la construcción de la agenda de investigación trans en Administración; (2) los lugares y no lugares de los travestis y transexuales en el mundo del trabajo; (3) la pedagogía trans como categoría de la diversidad organizacional y (4) estrategias de expresión de género trans en el ambiente de trabajo. Las categorías debatidas en este trabajo señalan caminos posibles para la consolidación de una agenda de investigación trans en los estudios brasileños sobre diversidad organizacional.

Palabras clave: *diversidad, inclusión, identidad de género, travestis, mujeres trans.*

INTRODUCTION

Researchers in the Brazilian or international fields of administration have recently been addressing the debate about people who are members of groups historically constituted as LGBT (lesbians, gays, bisexuals, travestis, transsexuals, and transgender people) in organizations and contexts of work and consumption (Baggio, 2017; Caproni & Saraiva, 2014; Garcia & Souza, 2010; Irigaray, Saraiva, & Carrieri, 2010; Irigaray & Freitas, 2011; Köllen, 2013, 2018; McFadden, 2015; Moura, Nascimento, & Barros, 2017; Natt, Saraiva, & Carrieri, 2015; Ng & Rumens, 2017; Paniza, Ichikawa, & Cassandre, 2018; Pereira & Ayrosa, 2012; Pereira, Ayrosa, & Ojima, 2006; Rumens, 2017; Siqueira & Zauli-Fellows, 2006). The literature, however, reveals a disparity in representing these groups and their identities in the organizational world and, consequently, in scientific research (Baggio, 2017; Carrieri, Souza, & Aguiar, 2014; Paniza, 2020).

In this sense, transgender people are the least well-represented in research in administration, including travestis and transgender women. As an umbrella concept, transgender (trans) people are those who do not identify, in different degrees, with the gender compulsorily assigned to them at birth (Jesus, 2012; Schwartz, Esch, & Bilimoria, 2017). Baggio (2017) explains that "the best-known non-binary identity is that of the travestis . They identify themselves using female names and pronouns, and express characteristics that are socially understood as being feminine" (p. 365), however, they will not necessarily want to undergo the transexualization process, which constitutes a set of bodily and social changes transition from the assigned gender (biologically) to the identified one (to which the subject recognizes its belonging) (Bento, 2006). Although there are distinctions in the literature with regard to the gender experience of transsexuals and travestis, these boundaries are not always demarcated by transsexuals and travestis themselves.

Although they converge as gender identity categories of people who were identified as male at birth, but who were later recognized as being woman (the reason for the frequent use of the generic term trans), the difference between the terms "travesti" and "transsexual" is that the word travesti has historically been offensive, because it frequently refers to trans people working in the sex market, or to the media construction of travestis, who are usually represented in situations involving crime and violence. The word transsexual, on the other hand, is a sanitized term that is representative of trans women who have undergone sex reassignment surgery. The term became popular in Brazil in the early 1980s when the first surgical procedure of this type was performed in the country, "leading to media and academic debates" (Barbosa, 2013, p. 360, our translation). There is, therefore, a contingency with regard to the meaning and use of the two words (travesti and transsexual) in Brazil, as expressed in Barbosa's ethnography (2013), which demonstrates a performative use of these two identity categories. Nevertheless, many intellectuals and activists from the trans movement defend the use of the term travestis as being political (York, Oliveira, & Benevides, 2020) and used to provide visibility for the viewpoint that is necessary for understanding the advances and achievements of the Brazilian trans community. On its official Instagram page the *Associação Nacional de Travestis e Transexuais* - ANTRA (Brazilian Association of Travestis and Transsexuals), stresses the importance of recognizing travestis for

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their historic contribution to the struggles and the demands they made of the state to guarantee the rights of the LGBT+ population. Whenever possible in this work, therefore, we will use the term trans and travesti to refer to the text's target audience.

Despite attempts to attribute concepts, authors such as Thanem and Wallenberg (2016) also perceive that tran categories are not stable. This is evidenced by the recognition that some travestis perceive themselves as transsexuals, or transsexuals who choose not to undergo sex reassignment surgery. There are also trans people who prefer to be called by very generic terms, such as "transgender person", regardless of their specific category. These dissonances, which were much theorized on by Butler (2016), led her to say that gender is a fictional fabrication, and the instability of these categories lies precisely in their nonconformity and attempts to oppose gender binarism, calling into question the very idea of gender as natural and self-evident. But despite being unstable, gender is still binary and heteronormative in relation to the subject's existential, cultural, and social attribution.

Muhr, Sullivan, and Rich (2016), however, state that not all trans people want to be seen as a man or a woman, and emphasize the transgression potential of the transgender body by challenging the man-woman, homosexual-heterosexual binaries, and the subversion of the male – penis, and female – vagina. This fluidity in trans terms and their meanings has been recognized as being a challenging point when it comes to proposing and operationalizing organizational policies in people management (Beauregard, Arevshatian, Booth, & Whittle, 2018; Ozturk & Tatli, 2016). A growing number of organizations are interested in constructing inclusive policies aimed at the trans/travesti population.

Based on a study that was carried out in Turkey, Ozturk (2011) wrote that studies involving the LGBT+ population indicate that "the hegemonic violence perpetrated against the transgender minority operates at an entirely different (far higher) order of magnitude. As such, a separate study would be appropriate for reviewing the employment experiences of transgender individuals" (p. 1102). Caproni *et al.* (2014) confirm the argument, and indicate that the barriers that limit access to the labor market are much stronger and very difficult for transsexuals and travestis to overcome. Carrieri et al. (2014) also reflect that "the social exclusion process of these categories does not operate in the same way, which makes the union of all these categories in a single movement and acronym (LGBT+) even more complex" (p. 81, our translation), thus corroborating international authors (Köllen, 2018; Ng & Rumens, 2017; Ozturk, 2011). Another challenging aspect is that organizational perspectives on gender in organizational literature and diversity practices emphasize cisgender men and women (Köllen, 2018). Further studies are, therefore, needed to analyze the world of work from the exclusive perspective of trans people, particularly women.

The focus of our essay is to debate the literature produced and applied in administration, particularly in people management and organizational studies. But the epistemological genesis of the debate on trans identities needs to be contextualized. We start from the understanding that gender is a malleable repetition of acts, and sex, desire, sexual practices, and the body are similarly produced by often diffuse discursive and performative acts, from the power and

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normativity relations that are present in meanings, institutions, social practices, behaviors, representations, and discourses (Butler, 2016). In turn, identities are characterized as unstable and fickle. They also occur repeatedly, destabilize the unitary subject in different theoretical fields, and call into question the notion of the universality of bodies and the homogeneity of the experiences of sexuality and gender (Butler, 2016, 2018). The questions that Butler (2016) raises with regard to essentialism and foundationalism are significant for critiques of identity politics (but not identities). They are also beneficial for resisting the truth and binary normalization regimes, such as male/female, masculine/feminine, homo/hetero, transgender/cisgender etc., such as queer politics, which enables the ambiguity, multiplicity, and fluidity of sexual and gender identities to be thought about, and suggests that we also think about culture, knowledge, power, education, and work (Louro, 2001).

Given this scenario, the aim of this article is to contextualize the literature published in the field of administration with regard to the experiences of trans and travestis women in the world of work, highlighting the challenges and opportunities that exist in this research agenda. The articles studied enabled us to construct four categories of meaning, which are presented in the following sections: (1) the construction of a trans research agenda in Administration; (2) the places and non-places of travestis and transsexuals in the world of work; (3) trans pedagogy as a category of organizational diversity; and (4) transgender expression strategies in the workplace. The final considerations present some of the points of similarity and dissimilarity between the findings of Anglophone and Brazilian literature.

BUILDING A TRANS RESEARCH AGENDA IN ADMINISTRATION

In December 2004, the journal, Group & Organization Management, published a special issue entitled "Gay, lesbian, bisexual, and transgender workplace issues." In the call for papers, the editor invited the academic community to share its experiences of workers from the then so-called LGBT groups, recognizing that, in the Academy of Management community, researchers had started to incorporate these themes in administration (Creed, 2004).

The vocabulary used in the call for papers confirms the novelty of the topic for administration academia. It presented what today might be considered conceptual errors (when compared with the current terms and categories used in the field). Among the arguments used to support the call for papers was the need to understand "organizations as the context for sexual prejudice" (Creed, 2004, p. 705). Almost 20 years later, there is a consensus in the literature that gender identity (transgender) is a different experience from the better known (at that time) sexual identity terms – gays, lesbians, and bisexuals (Baggio, 2017; Köllen, 2018; O'Shea, 2018). Despite this blurring of the lines between sex and gender identity, which would probably not go unnoticed by a journal reviewer these days, the editor recognized the diversity of the professional experiences of the social groups represented by the acronym (Creed, 2004).

The special issue of Group & Organization Management was published with four articles that mentioned the LGBT public, except for the "T" (trans) public. This public remained excluded from the research agenda, which indicates an absence of studies examining the formal work environment, and its marginalization (Creed & Cooper, 2008). The debate about the LGBT+ public in this field of Brazilian academia started in the mid-2000s. The first studies were presented at events organized by Associação Nacional de Pós-graduação e Pesquisa em Administração (*ANPAD*) and later published in journals of the field. As in the English-speaking context, discussions began with a focus on experiences of sexuality in the workplace (Siqueira & Zauli-Fellows, 2006), with issues such as the construction of a research agenda relating to gay workers, and survival strategies for this population in the organizational environment.

The agenda of events held by *ANPAD* at that first moment included gay consumption experiences and construction of the gay identity (Pereira *et al*., 2006), and recognized the need to expand research in order to understand other homosexual segments. The research so far had focused on highly educated gays with high purchasing power. It is worth pointing out that unlike in the North American context, the first Brazilian studies did not mention the existence of an LGBT+ group, although (Pereira et al., 2006) suggested further research (from the perspective of consumption) to include groups such as "older men, couples, people from lower economic classes, transsexuals, lesbians, and 'bears.' The audience is extremely diverse, and the characteristics of these different groups can be equally very different" (p. 14, our translation).

After the 2010s, the development of both Brazilian organizational literature and organizational literature in English demonstrates that researchers have focused on internal differences within populations that are represented in the LGBT+ acronym. Some studies, however, have only mentioned transgender people as an element of the acronym, and included them in the references, which suggests that the trans travesti group was absent as a category of organizational diversity in work environments compared to gays, lesbians, and bisexuals (Bell, Özbilgin, Beauregard, & Sürgevil, 2011; Carrieri *et al*., 2014; Köllen, 2018; Ng & Rumens, 2017; Schwartz *et al*., 2017; Theodorakopoulos & Budhwar, 2015).

PLACES AND NON-PLACES FOR TRAVESTIS AND TRANSSEXUALS IN THE LABOR MARKET

Few works have been published in Brazilian journals of administration about travestis, transsexuals, and lesbians – about female sexuality and gender identities – when compared to the number of research projects involving gay men, for example (Carrieri *et al*., 2014; Paniza, 2020; Teixeira, Oliveira, Diniz, & Marcondes, 2021). In the six articles addressing the issue of travestis and transsexuals that have been published in Brazilian journals (Baggio, 2017; Caproni & Saraiva, 2014; Carrieri *et al*., 2014; Ferreira & Pereira, 2020; Muller & Knauth, 2008; Paniza *et al*., 2018) and in administration books (Irigaray, 2012; Prado & Freitas, 2016), professional spaces are demarcated, revealing limitations and constraints as to what a trans travesti woman does (or can do) in the work dimension. It is important to stress, however, that many of these experiences do not occur in the formal labor

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market, as shown in the literature (Baggio, 2017; Beuaregard *et al*., 2018; Caproni & Saraiva, 2014; Carrieri *et al*., 2014; Irigaray, 2012).

Another relevant point for contextualizing these places in the world of work is the different life experiences of those who identify as travesti or transsexuals (Carrieri *et al*., 2014). Both genders have experiences – especially in the case of travestis – that destabilize the female-male binarism because they trigger other possible ways of thinking about body, gender, and sexuality. The medical-psychological discourse established the need to produce a "real" transsexual person of the appropriate sex by way of surgical intervention and hormone therapy, making it essential for them to "own" this real sex. This was accompanied by a name change and physical and performance expressions, according to the gender they identify with and that represents them (Santos, 2017).

Some gays and lesbians can `hide' their sexual identity, despite the difficulties they have in accessing and/or staying in the labor market, as long as lesbians do not adopt not feminized appearance and gays do not perform in a feminine way; gender-centered performances must respond to the stereotypes and norms of cis-heterosexuality. For travestis and a large proportion of transsexuals, however, there is no possibility of remaining in the "closet", except in cases where there is passability, that is, others who perform in a similar way to cisgender people (in gestures, appearance, clothing, voice, hormone therapy, etc.). The situation that trans travestis face in companies and the world of work becomes even more critical (Baggio, 2017; Caproni & Saraiva, 2014). Even though in countries such as the UK and the US, legal mechanisms have emerged in recent years to help expand the possible places in the labor market for trans travestis people, no significant advances have been noted in terms of expanding their access to the professional place (Beauregard *et al*., 2018; Ozturk & Tatli, 2016; Rudin, Ruane, Ross, Farro, & Billing, 2014). But barriers to accessing the labor market begin long before a travesti woman can apply to undergo a recruitment and selection process.

Education is a bottleneck in the lives of tran travestis because, since childhood, social life has been very hostile to them in collective environments, making it difficult for them to remain in school. But as the social exclusion mechanisms in the lives of trans travestis do not operate alone, even if they have a high level of education, few transsexual and travesti employees hold prominent positions in the organizational hierarchy. This argument of the inaccessibility of trans travestis to more powerful jobs is emphasized by Beauregard et al *et al*. (2018) and by Irigaray (2012) in one of the first Brazilian texts on trans travestis, which exemplifies the case of a professional who, despite having all the technical and educational requirements, was unable to access jobs for better qualified people. Precisely for this reason, civil service examinations often end up being one of the only possibilities for the professional insertion of trans travestis (Carrieri *et al*., 2014).

As previous studies have shown, the sector in which trans travestis professionals work has an effect on whether they have a more positive or negative experience. The path in which this phenomenon operates is relatively similar to the fact that some organizational segments are more receptive to cisgender women (Ozturk & Tatli, 2016). Irigaray (2012) highlights that the most receptive work contexts for trans travestis are the beauty, entertainment and art segments. Consequently, the work context of trans travestis is largely defined by self-employment, underemployment,

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informality, or even by exclusion from the labor economy. Beauregard *et al.* (2018) claim that transsexual people lack power and status in most work environments. Furthermore, since there are few trans travestis in mid-level operational professional roles, their low representation as leaders in the management of companies means that they have no representation in companies (Beauregard *et al.*, 2018).

Many employers are not interested in opening up to the issue of trans travestis identities. In the study by Ozturk and Tatli (2016), an interviewee pointed out that trans women receive fearful looks and are subtly passed over in the recruitment process. That is why legal protection mechanisms are not always as effective as expected in guaranteeing access to the labor market. Consequently, the justifications for a trans or travesti not receiving a job position are never known because it is impossible to discover if it was due to their technical inadequacy, or because of transphobia, which is understood as aa "generalized distaste for all those who transgress gender norms" (Rudin *et al.*, 2014, p. 729), which are here understood from the binary point of view – male/female. In this context, prejudice is the main reason for the low rates trans travestis in occupations. And even when the barrier of prejudice is overcome, and they can access employment, some work contexts become so intolerant of transgenderism that the professional ends up choosing to resign (Beauregard *et al.*, 2018; Clark, 2015).

The nuances of the trans travesti life experience have an impact on professional careers because not always a person who was compulsorily designated a boy at birth may want a female gender identity as a final destination, in the fixed molds of what society recognizes as a woman (O'Shea, 2018). In this perspective, people who want to achieve a normatively-fixed destination gender tend to experience environments that accept them more readily, and where they experience social respect; for example, trans women who undergo the full gender transition process, including hormone therapy and sex reassignment surgery (Carrieri *et al.*, 2014; Ozturk & Tatli, 2016; Rudin et al., 2014).

The justification some transsexuals have for gaining access to the job market in companies also lies in the fact that their bodies are more appropriate to the social norms established for the female body. But what makes this social experience less uncomfortable is hiding their transsexuality, that is. as well as having a body that is socially interpreted as being female, they also need a legal female name (ID). In this context, "the visibility of the dual social and birth identity harms transsexuals in their search for work, and actually working" (Carrieri *et al.*, 2014, p. 90, our translation). Concealment of trans condition in line with the appearance of the gender presented in the identity document expresses passability, the degree to which transgender people are interpreted as cisgender people (Baggio, 2017).

Gender transition itself is an experience that exposes trans people to career risks when the transition starts while the person is in employment, regardless of the professional context n which they work. The experience of the only trans woman interviewed by Baggio (2017) – she was working in three different jobs during the transition process – indicates a way of managing the impact of the process on the person's career. After disclosing the transition to two of her employers, she was dismissed on the same day: she kept her third job by not mentioning it! Schwartz *et al.* (2017) add that when professionals in this situation are not dismissed, they may

be discriminated against and become the victims of microaggressions for a period until they are eventually dismissed (Schwartz *et al.*, 2017).

Other strategies for the self-inclusion of trans travestis women in the labor market include working from home by only accepting jobs that can be performed in this private environment. This choice often stems from the experience of having worked in traditional work environments in the past in which bad experiences were unavoidable because they have no control over the peers they must relate to. Being able to work autonomously, therefore, is also a way for trans travesti to shield themselves from toxic relationships, but it is worth noting that this can be a strategy of exclusion and confinement of this worker from the public space. (Beauregard *et al.*, 2018).

If recruiters prevent trans people from competing for positions in the formal environment, the stigma attributed by society to travestis and transsexuals will lead to their professional life's conditions becoming naturalized, so they will choose only to work in sectors that are socially constructed as female workspaces, such as the beauty sector, as Baggio (2017) observes. The social perception of the bodies of travestis and transsexuals, however, means that, for the most part, they move "naturally" into prostitution (Caproni & Saraiva, 2014; Paniza*et al.*, 2018). Their experiences tend to be markedly more negative in developing countries than in developed countries (Ozturk & Tatli, 2016). There is also the physical violence that trans and travestis suffer in public spaces, making the streets a constant danger, especially if they do not express themselves in a cis-heterosexual way, and because they break with the structural patterns of hegemonic masculinity, which subordinate any dissonant gender expressions of the cisgender male/cisgender female binary (Carrieri *et al.*, 2014; Diniz, 2016).

Beuaregard *et al.* (2018) state that trans voices are inaudible in the workplace due to their negative experiences in the work context. This subordinate condition takes away the power of a group that does not have a voice. We can say, therefore, that there are many more non-places than places in the work environment for travestis and transsexuals. This scenario suggests the need for a teaching effort to make trans travestis agendas more visible to the professionals and students involved in management activities in organizations, an issue that will be discussed in the next section.

TRANS PEDAGOGY AS A CATEGORY OF ORGANIZATIONAL DIVERSITY

The emergence of a transgender pedagogy in literature reveals that travestis and transsexuals are a "new" group for organizations and the (formal) work environment. The very titles of some of the published articles lead to this interpretation. For example, Baggio (2017) introduces trans people as "new subjects for studies into organizational diversity" (p. 360). But we should reflect on the use of the adjective 'new.' Trans and travestis people have always existed socially, but they did not express their transgenderism because it was not permitted, especially in business organizations. Furthermore, given the historical and structural character of marginality and

exclusion, this population frequently avoided applying for work in an organization, even on a voluntary basis, because they would probably be rejected.

Two of the studies published in Brazil are teaching cases, which have the common objective of preparing students and work teams to learn about the social experiences of acceptance and exclusion of travestis and transsexuals in the workplace (Caproni & Saraiva, 2014; Paniza *et al.*, 2018). On the agendas of these teaching cases, there are issues such as: the acceptability and receptivity of travestis and transsexuals in organizations and companies, prejudices, stigma, the violence suffered/experienced in the work context, and actions, possibilities, and alternatives for achieving effective inclusion of this population in society and the world of work. With regard to the pedagogical character of some of the proposed debates, the scenario is little different internationally. In the American and European context, Schwartz *et al.* (2017) propose "bringing transgender issues into management education" (p. 300), Beuaregard *et al.* (2018) invite readers to "listen carefully [to] transgender voices in the workplace" (p. 1), Rudin et al *et al.* (2014) explore the "hostile territory: employers' unwillingness to accommodate transgender employees" (p. 721). Thus,

> [...] students need to be prepared to understand and leverage differences in their current and future coworkers, employees, and clients across the multiple dimensions of diversity, including how a person identifies, experiences, and expresses their gender (Schwartz et al., 2017, p. 301).

The pedagogical gap between training management students and LGBT+ sexual and gender identities, including transgender identities, had already been noticed a few years earlier (Rudin *et al.*, 2014; Rumens, 2016). Rudin *et al.* (2014) presented a case to students on an organizational behavior course of an undergraduate program. The case refers to a trans female employee in a company and the negative reaction of a cisgender co-worker with regard to sharing the bathroom with this colleague, who was in the process of gender transition. The students offered suggestions of what the CEO should do to address the issue. The authors considered that the most inclusive suggestion students could give to the CEO was to adopt the use of unisex bathrooms in the company, but only 27% of the almost 200 students offered this suggestion. Compliance (i.e., complying with the current rules regarding respect for trans identity) was the most recurring decision (38%) – in this case, the students suggested instructing co-workers to respect the trans identity of their peers, thus ensuring that the trans could use the bathroom. The most hostile response to the situation presented in this case, however, had a high adherence rate (30%) from students, with students deciding that the transsexual female worker should be barred from the women's restroom due to the absence of laws protecting female workers in this situation (Rudin *et al.*, 2014).

The indices of hostile reactions toward transgender individuals by management students indicate that when many of these students find themselves in managerial positions, they will continue to behave transphobically in the work environment, and so not comply with existing

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anti-discrimination laws (Rudin *et al.*, 2014). This reverberation of violence from professionals who have already graduated is a reflection of the constitution of management education practices. As Rumens (2016, p. 47), explains "business schools can be hostile places of work for LGBT academics, and much progressive work needs to be undertaken in that respect to address the issue." In this sense, there is an evident need for (trans)pedagogical practices to go beyond undergraduate education and be adopted in other contexts in order to reach managers and other audiences that are immersed in business practice (Schwartz *et al.*, 2017).

On the executive education agenda, journals such as the Harvard Business Review have carried articles to guide managers towards an understanding of the context of inclusion of trans people in the work environment (Clark, 2015; Hull, 2015; Thoroughgood & Sawyer, 2017). These articles addressed issues such as using the bathroom, how co-workers should react vis-à-vis a colleague who comes out as a trans, and the issue of addressing the trans person using the correct pronoun and name. The very lack of participation of trans people in leadership positions in organizations, however, is also included in this managerial debate.

Schwartz *et al.* (2017) argue that knowing the personal experiences of trans people is a first step toward trans pedagogy in management education. Another step forward for this agenda is to indicate practices in the workplace that favor the construction of a more inclusive environment. Regarding the use of restrooms, Rudin *et al.* (2014) assess that although it may seem a trivial experience for cisgender people, it is a considerable source of suffering for trans people. It is even common for them to avoid using this space in public places as a way of protecting themselves from aggression (Paniza *et al.*, 2018).

Since not all trans people choose to go through or complete the gender transition process (O'Shea, 2018), Beauregard *et al.* (2018) recognize the need for organizations to act on behalf of those trans people whose gender performances are more visible, those with less passability, or those who have difficulty being recognized for the gender with which they identify. This repeatedly occurs in the Brazilian context, especially with those who identify as travesti. Practices that promote a broader inclusion of this population can act as a mechanism for spreading more knowledge about transgender experiences and enabling increased social acceptance. Two elements reinforce the degree of passability according to Baggio (2017): the name (changed to follow the gender transition, known in Brazil as the "social name"), and the appearance or expression of gender. If the trans person is unable to change their birth name, passability reduces. On the other hand, as any name change requires time and money in Brazil – since it involves legal issues – the author observes that passability also involves a class dimension.

With regard to the lack of preparation of the cisgender public and the convergence of the literature regarding the need for trans organizational pedagogy, it is not always bad intentions that lead to incorrect grammar when addressing trans and travestis. In some situations, the professional does not have the necessary knowledge to act appropriately. But cruel and intentionally disrespectful treatment by peers is a frequent occurrence due to the refusal to recognize the existence and life of the trans travesti (Baggio, 2017; Caproni & Saraiva, 2014; Ozturk & Tatli, 2016). An organization's teaching actions may be sufficient for protecting trans travesti

employees from the violence that is practiced by internal members of the organization, but not to protect them from its external public, such as clients. One Brazilian transsexual interviewed by Paniza *et al.* (2018) reported that they routinely receive a more sexualized approach from clients than their cisgender coworkers in the same environment. The professional has even been followed on the street because the client thought she was a call-girl. Another recurring situation experienced by the professional was the organization's customers refusing to be attended by her.

Although many managers, workers, and companies are making an effort to treat trans with respect and acceptance, a transsexual interviewed by Ozturk and Tatli (2016) realized that her organization's commitment to diversity was only superficial. She reported that the only measure adopted for educating new employees about diversity was to submit them to an online course, which they could pass by responding to a multiple-choice test. This illustrates that a genuine commitment from organizations is paramount in allowing trans travesti employees to be themselves. However, the attitude of some companies is to adopt a superficial organizational practice rather than promoting significant structural changes in terms of building a more inclusive work environment (Ozturk & Tatli, 2016; Saraiva & Irigaray, 2009). Researchers in the field of communication have questioned this mismatch between the representations and practices of corporate diversity, calling it 'diversity washing' (Carrera & Torquato, 2020).

In this sense, the criticism of simply offering an online course on the trans issue reveals the need for an integrated approach, as Schwartz *et al.* (2017) argued. Adopting a basic initial repertoire on transgender/travesti issues in the organization is an important initiative, but is only a first move, and other education actions must occur simultaneously. Building a friendly organizational climate for trans people requires measures in terms of insertion and inclusion in the work environment, and an adjustment of the physical and behavioral structures. Concerning sexual identities, this pedagogical movement has already ensured advances in terms of a greater understanding of the life experiences of gays and lesbians in the workplace, which has resulted in better representation and more visibility in employment positions, and even in the extension of rights and benefits that were previously granted only to heterosexual couples, for example (Siqueira & Andrade, 2012). For gender identities, however, this teaching approach needs to be given more space in management education. Workplaces today are generally hostile to the trans and travesti identity, and generally speaking, when participation occurs in these contexts it is guided by a repertoire of coexistence strategies that need to be activated to make the experiences of trans/travesti less negative.

TRANSGENDER EXPRESSION STRATEGIES IN THE WORKPLACE

Trans people share the same experience of expecting a negative and violent reaction from others wherever they are in day-to-day life (O'Shea, 2018). They consequently adopt a repertoire of strategies when interacting with colleagues in the workplace to manage their subordinate position within the heteronormative binary gender matrix, as shown in several articles (Baggio,

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2017; Beuaregard *et al*, 2018; Muhr et al, 2018; Muhr *et al*., 2016; Ozturk & Tatli, 2016). Many trans people even choose to hide their identity, in a process that is similar to being "in the closet." It is worth remembering that a large number of Brazilian trans travestis are unable to hide their identity due to their mixture of characteristics that are socially interpreted as being either male or female (Carrieri *et al*., 2014). Some of the travestis interviewed by Thanem and Wallenberg (2016), however, hide their female characteristics in the workplace as much as possible in order to pass off as male workers, and so their co-workers do not perceive their travesti identity.

Like gays, lesbians, and bisexuals, the emotional effort demanded by trans travestis employees to hide their real gender identity can lead to considerable consequences, such as constant feelings of fear, or even suicide (Clark, 2015). "Coming out of the closet" in itself is not a safeguard for well-being at work. It is common for trans to be stigmatized when clients, co-workers, or managers learn of their gender identity (Ozturk & Tatli, 2016). Although remaining in the 'closet' is possible for many trans and travestis, and concepts such as passability corroborate this dynamic, Beuaregard *et al*. (2018) point out that it is not an option for all of them. Consequently, these "non-invisible" people are unable to build facades to hide their identities. What is expected from the findings in the field of people management research is that the most frequently recognized practices respond to the challenge of respecting transgender employees, regardless of their choice as to whether to reveal or hide their transsexual or travesti identity (Beauregard *et al*., 2018).

Another common experience in the gender expression management of trans women employees is the loss of power over their careers. As many industries and sectors of the economy are traditionally adopt a restrictive attitude to trans travesti, choice of career often ignores issues such as increasing professional capital by aiming for career advancement, or becoming more experienced. The common attitude is to look for a professional environment that has at least minimal receptivity (Ozturk & Tatli, 2016).

Moving away from the transgender community is also a strategy adopted by trans travesti for managing their identities. After gender transition, many trans prefer to remain anonymous, thus avoiding being perceived as different in the social environment (Baggio, 2017; Carrieri *et al*., 2014). Prudence with regard to disclosing their transgender identity can be related to the intensity with which they perceive themselves as being a "new" member of a gender that is now authentic – the experience of feeling fully like a woman or a man. Discretion to the point of pretending to be cisgender also avoids the stigmatization of people who are socially understood as transsexuals. The consequence is that trans professionals who opt for anonymity in relation to their gender identity implies that the binary gender discussion – trans man/trans woman – drowns out many trans voices and conceals their agendas (Beauregard *et al*., 2018).

Pre-transition identity exclusion is another strategy used by trans people for managing their new personal constitution as a member of another gender. However, this strategy jeopardizes the person's professional life because, by "erasing" her work past, relevant professional experiences that are valued in recruitment and selection processes may be left behind, and the applicant may be disregarded as if she did not have the required professional experience (Beauregard *et al*., 2018). But Muhr *et al*. (2016) criticize individualizing approaches to transgender experiences because

many of the issues that affect trans career choices in work contexts are naturally interactive, and the appearance of their body cannot be considered. In this sense, the constraints experienced by trans and travestis are contingent on the occupations and types of organizations in which they work. For example, the subjectivity of trans and travestis is often "softened" in culture and art workplaces, whereas manual labor environments that require a lot of personal contact with clients presuppose greater caution with regard to transgender performance. In this sense, trans people experience a process in which they are constantly negotiating their gender performance. They build references with which to explain or hide the different possibilities of gender expression (Muhr *et al.*, 2016).

To enable the contingent and contextual analysis of trans identities, Muhr *et al.* (2016) proposed the concept of situated transgression. While transgender identity is considered a transgression of gender and binary norms (Thanem & Wallenberg, 2016), the authors advocate a more localized approach for situating these experiences of gender subversion. Although only one trans woman was the subject of the authors' research, their results demonstrated the mobilization of degrees of transgressiveness that were contingent on the three work contexts in which the trans woman who was the subject of the research worked. The formal work context was the environment in which she used her transgressor gender repertoire sparingly, whereas in the environment in which she acted as a trans rights activist she used her right to express her trans gender performance intensely.

Although much of the transgender literature focuses on the potential for the gender transgression of bodies, Thanem and Wallenberg (2016) argue that the gender transgression of the trans person needs to be seen as a process that can also occur subtly. Paradoxically, while trans and travestis voluntarily challenge traditional gender roles, they tend to incorporate these roles when interacting with their peers (Thanem & Wallenberg, 2016). In short, this incorporation of traditional gender roles also seems to be a strategy adopted by trans for dealing with their gender expression and in order to be more readily "accepted" in their professional environments.

When a worker undergoes gender transition, the meanings assigned by peers can also be interpreted through the lens of binary gender norms. In this sense, when a trans man is with his male peers, he experiences an increase in his capital and feels more valued and respected, and starts being listened to more in decision-making processes. On the other hand,, when a trans woman is placed in the feminine category, she experiences the negative reactions that cisgender women experience, such as being interrupted in meetings. These examples signal both the difference of the trans experience in terms of masculinity and femininity and the fact that trans bodies are also disciplined by heteronormativity and sexism, which require them and cisgender people to be congruent in their actions and expressions (Muhr *et al.*, 2016).

One issue to be noted, however, is that slotting trans and travestis into binary categories is only facilitated when transsexuality does not express masculinities or femininities outside the socially perceived standards. For example, trans women with a high degree of passability do not have any great difficulty in carrying out activities that are only performed by cisgender women. When a trans woman expresses an alternative femininity (mixing elements that are

regarded as masculine, for example), in order to have a minimum degree of stability in social relationships she needs to "make" herself participate in rituals to reinforce the stereotypically traditional gender roles (Thanem & Wallenberg, 2016). Therefore, a transsexual or travesti who does not submit to the norms of the sex-gender-body system is often placed on the sidelines of the conjectured hegemonic expressions for the feminine and masculine (Louro, 2001). The disparity in their difficulties and experiences intensifies when touched by other social markers, such as race/ethnicity, class, or disabilities.

Therefore, in the process of "doing" gender, the subjects manage the gender expressions by which peers can perceive their behavior in the environment as being either appropriate or inappropriate. For Thanem and Wallenberg (2016, p.250), understanding this process helps us understand "how women and men in organizations "do" gender appropriately by constructing, expressing and maintaining binary gender roles and identities through everyday social practices."

FINAL CONSIDERATIONS

Advances in trans travesti organizational literature are much more theoretical than empirical. McFadden (2015) lists some factors that explain the low representation of this population in literature: (1) large groups of research subjects are hard to access; (2) there is a mismatch between the visibility and voice of transsexual people, especially in organizational contexts; (3) it is not always easy for researchers to gain access to this public, especially since many studies on LGBT+ adopt convenience as the criterion for selecting subjects, and consequently they approach those closest to them; 4) stigmatization and society's prejudiced perception of trans people often make them unwilling to participate in research into LGBT+; and, finally, 5) after the end of their gender transition, many subjects decide to maintain a discreet position in their organizations, hiding the fact that they are trans.

No texts refer to the experience of transgender/travesti in work contexts in a positive way. On the contrary, they all indicate how completely marginalized trans and travesti are, which leads to physical and/or interpersonal violence, and frequently results in them working in prostitution (Caproni & Saraiva, 2014; Carrieri *et al*., 2014; Irigaray, 2012). From this perspective, marginalization and social exclusion are greatly reinforced by Brazilian literature. Brazilian authors emphasize that vulnerability and stigmatization are central for understanding the living conditions of trans travesti. One of the stigmas they experience in the context of health care is the perception, on the part of professionals in the area, that they all carry the HIV virus. This understanding occurs because of the automatic link that has been established between identifying as a trans or a travesti and prostitution (Carrieri *et al*., 2014; Muller & Knauth, 2008; Paniza *et al*., 2018). The issue of the costs associated with changing their name and acquiring a new legal identity was also raised and discussed by Baggio (2017). This is crucial for enabling transsexual people to have better social experiences, thereby reinforcing the social class dimension in the life of Brazilian trans women.

In both contexts, carrying out research with large groups of participating subjects is a challenging task. The seminal Brazilian article – from the point of view of the fact that it was written exclusively by authors from the field of administration – attracts our attention because, when they characterized the research subjects (lesbians, travestis, and transsexuals), the researchers emphasize the fact that the trans public was the most cautious about taking part in the project, thus reinforcing the difficulties encountered in accessing this population (Carrieri *et al.*, 2014).

The pedagogical interest in tran agendas is common to both Brazilian and international literature, either because the trans population represents the inclusion of a "new audience" for organizational diversity (Baggio, 2017), or because management students need to be prepared to deal with different gender identities (Schwartz *et al.*, 2017). The debate undertaken in this work expresses the authors' efforts to mobilize the vocabulary, particularities in terms of life experiences, and professional careers of trans travesti. The importance of including these themes in management education environments is highlighted by the argument that, even if a manager's personal beliefs do not allow them to accept a trans person, "they have a moral imperative to consider human dignity (...) and a legal imperative to ensure that discrimination does not exist" (Schwartz *et al.*, 2017, p. 306).

Future research should be anchored in transfeminist epistemologies and knowledge (Jesus, 2015) and address "the voice of transgender workers to ascertain if current voice mechanisms, such as LGBT networks, are adequate for representing transgender workers, or if employee-specific groups should exist" (McFadden & Crowley-Henry, 2018, p. 21). It is worth noting that the creation of networks of workers from LGBT+ groups and allied people (heterosexuals and cisgender people who support the LGBT+ cause) in companies has been a strategy adopted by multinational companies in Brazil, as evidenced by the business media (Rossi, 2015). The presence of Brazilian travestis and transsexuals in the formal work environment of large companies is not very representative of daily life. Efforts are still needed to ensure effective social recognition of trans lives, since this population still lacks access to the most basic social rights and public policies (Muller & Knauth, 2008), such as access to health and education systems, even though we have a significant number of travestis and trans women who exercise different professions and work in different organizational segments.

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AUTHOR'S CONTRIBUTION

Maurício Donavan Rodrigues Paniza and Marcielly Cristina Moresco worked on the conceptualization and theoretical-methodological approach. The theoretical review was conducted by Maurício Donavan Rodrigues Paniza and Marcielly Cristina Moresco. Data collection was coordinated by Maurício Donavan Rodrigues Paniza and Marcielly Cristina Moresco. Maurício Donavan Rodrigues Paniza and Marcielly Cristina Moresco participated in the data analysis. Maurício Donavan Rodrigues Paniza and Marcielly Cristina Moresco participated in the writing and final review of the manuscript.

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CONFIGURATIONAL ANALYSIS OF PROXIMITIES IN INNOVATION ALLIANCES

Análise configuracional das proximidades em alianças de inovação

Análisis configuracional de proximidades en alianzas de innovación

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ABSTRACT

Alliances have become a critical factor for innovation development. However, the lack of proximity between partners, which goes beyond the geographical facet, can influence alliance' outcomes. Despite this understanding, little is known about the interrelationship of proximities in innovation alliances. This research aims to underscore which proximities' combinations lead to exploration and exploitation alliances. To achieve this goal, we conducted a survey with 174 high-tech companies and adopted the method of Comparative Qualitative Analysis (QCA). The results underline the exploration alliances reliance on social, cognitive, or institutional proximity with physically close partners. Furthermore, exploitation alliances are dependent on cognitive and social proximity, in addition to the absence of organizational proximity. We conclude that alliances innovative orientation does not differ across all proximities dimensions and we highlight the relevance of social ties.

Keywords: Proximity, alliances, exploration, exploitation and innovation.

RESUMO

As alianças tornaram-se fator crítico para o desenvolvimento da inovação, contudo a falta de proximidade entre os parceiros, que vai além do aspecto geográfico, pode influenciar os resultados. Apesar desse entendimento, os estudos não avaliam a inter-relação das proximidades em alianças de inovação. Esta pesquisa busca compreender quais combinações de proximidades levam a alianças exploration e exploitation. Para perscrutar esse caminho, realizou-se um survey com 174 empresas de alta tecnologia; como método, adotou-se a Análise Qualitativa Comparativa (QCA). Os resultados encontrados destacam que, no contexto de parceiros próximos fisicamente, as alianças de exploration são dependentes de proximidade social, combinadas com proximidade cognitiva ou institucional. Já as alianças exploitation são dependentes de proximidades cognitiva e social, somada à ausência de proximidade organizacional. Tem-se como conclusão que a orientação inovadora das alianças não depende do desenvolvimento de todas as dimensões de proximidade e destaca-se, assim, a relevância dos laços sociais.

Palavras-Chave: *Proximidades, alianças, exploration, exploitation, inovação e ambidestridade.*

RESUMEN

Las alianzas se han convertido en un factor crítico para el desarrollo de la innovación, sin embargo, la falta de proximidad entre los aliados, que va más allá del aspecto geográfico, puede influir en los resultados. A pesar de esta comprensión, faltan estudios que evalúen la interrelación de la proximidad en las alianzas de innovación. Esta investigación busca comprender qué combinaciones de proximidad conducen a alianzas de exploration y exploitation. Para lograr este objetivo, realizamos una encuesta con 174 empresas de alta tecnología y adoptamos el método de análisis cualitativo comparativo (QCA). Los resultados encontrados resaltan que, en el contexto de aliados físicamente cercanos, las alianzas de exploración dependen de la proximidad social, combinada con la proximidad cognitiva o institucional. Mientras que las alianzas de explotación dependen de la proximidad cognitiva y social, además de la ausencia de proximidad organizacional. Concluimos que la orientación innovadora de las alianzas no depende del desarrollo de todas las dimensiones de proximidad y destacamos la relevancia de los lazos sociales.

Palabras clave*: Proximidades, alianzas, exploration, exploitation, innovación.*

INTRODUCTION

The competitiveness of companies does not only occur with internal resources and capabilities, which is why it is important to access external sources of knowledge (Martínez-Noya & Narula, 2018). Alliances enable access to new knowledge (exploration) and leverage existing knowledge (exploitation) (Kauppila, 2010), which is relevant for the survival of firms, which need to balance radical and incremental innovation, which is known as ambidexterity (Blindenbach-Driessen & Ende, 2014).

It is important to consider that there are tensions between efforts for radical (exploration) and incremental (exploitation) innovation, as they require different structures, processes, strategies, capabilities, and culture (He & Wong, 2004), but compete for the same organization's resources, as advocated by March (1991) and recently empirically proven (Li, Fu, Liu, 2020). Thus, alliances are particularly relevant in the search for innovation because they can compensate for the lack of internal resources needed to simultaneously explore new innovation trajectories and refine existing ones (Lavie, Stettner & Tushman, 2010).

The diversification of partners in alliances is considered an antecedent that can affect the performance of companies that innovate by exploration and exploitation (Ardito, Peruffo, & Natalicchio, 2019), however, there is a need to investigate this relationship from a more contingent perspective (Yang & Li, 2011), in which the same antecedents can work in a different way, although integrated (Liu, Wang & Li, 2019). Therefore, it is important to analyze in an intertwined way how different backgrounds of partners, such as size, age, type, and location (Leeuw, Lokshin, Duysters, 2014), support innovation (Benner & Tushman, 2003). Therefore, it is proposed to investigate how proximity integration can reflect in exploration and exploitation innovation alliances. However, proximity is not only limited to the spatial issue, as there are other antecedents that also influence inter-organizational relationships, such as: organizational, cognitive, social, and institutional (Boschma, 2005).

The proximity theme is relevant and aroused interest because, in scenarios of low proximity between partners there may be coordination, communication, and even conflict issues (Mattes, 2012), on the other hand, too much proximity can lead to stagnation and locked-in (Boschma, 2005). However, little is known to what degree of proximity alliances are more likely to maximize innovation (Martínez-noya & Narula, 2018), especially those of different types – exploitation and exploration. As a result, studies on the subject suggest the existence of interrelational compensation effects between types of proximities (Boschma, 2005; Hansen, 2015; Huber, 2011). In other words, it is not necessary to be close in all dimensions to achieve innovation results, but it is necessary to know which configurations of these proximities have the greatest impact for companies to innovate.

In this way, seeking to contribute to advances in literature, we analyzed the combinations of proximities in innovation alliances and sought to answer the following question: How does the interrelationship of proximities influence innovation alliances for exploration and exploitation? To meet the objective of this research, a Qualitative Comparative Analysis (QCA) was structured, which focuses on the combined effects of causal conditions, assuming that the causes of an

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event are complex, interdependent, and holistic (Ragin, 2008). QCA was applied with data from a survey of 174 high-tech companies which carry out alliances for both exploitation and exploration. Finally, we emphasize the interrelationship of non-spatial proximities, which is still lacking in literature, as the focus in most works is geographic proximity (Steinmo & Rasmussen, 2016; Ardito et al., 2019).

Furthermore, this work contributes to the changes inherent and imposed by the COVID-19 pandemic. In a global context, in which everyone was forced to remain physically distant, understanding the behavior of other types of proximity can favor the maintenance of collaboration strategies. Furthermore, in times of economic crisis, companies with the capacity to innovate will survive, either through their individual competencies or through alliances. Thus, diving into the proximity approach, in the innovation alliances context, can be enriching for 21st century entrepreneurs.

INNOVATION AND PROXIMITIES

Research and development cooperation has become a central aspect of the innovation strategy of high-performance organizations (Martínez-Noya & Narula, 2018). They consist of processes that enrich the portfolio of resources, quality and timeliness of information, in addition to increasing knowledge about markets and technologies (Bouncken, Pesch & Kraus, 2015). Thus, companies that use alliances will be able to improve their innovation strategies and, above all, their pioneering capacity (Bouncken et al., 2015).

In this scenario, the importance of investigating the knowledge acquisition strategies of alliances and their impact on innovation results grows. There are two knowledge access strategies: exploration and exploitation. Exploration is associated with research, variation, risk taking, experimentation, flexibility, discovery, and innovation. Exploitation is related to refinement, choices, production, efficiency, selection, implementation, and execution (March, 1991). Exploration innovations are radical proposals that require new knowledge, which is different from those dominated by the company, therefore, fundamentally offering new products (Jansen, Vera, & Crossan, 2009; March, 1991). Exploitation innovations are increments that are based on existing knowledge, thus expanding the company's knowledge base and therefore, improving established products without changing the basic nature of skills, processes and structures (Jansen et al., 2009).

Alliance diversification is an antecedent of balance between exploration and exploitation, however, when companies excessively diversify their alliance portfolios, they may face difficulties due to the huge amount of knowledge they access, generating confusion and reducing the likelihood of seeking learning activities (Ardito et al., 2019). Many studies make an effort to understand the exploration and exploitation alliances with innovation, however, recently, research suggests the need to investigate this relationship from a contingent perspective (Yang & Li, 2011). For this, there are two most popular approaches: integration and differentiation. As denoted by the terms, integration considers exploration and exploitation as synergistic and intertwined strategies, while differentiation focuses on unique aspects that leverage exploration or exploitation

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separately (Benner & Tushman, 2003). For this integrative view, it is taken into account whether the same antecedents can work in a distinct and integrated manner for exploration and exploitation.

In this context, we propose to investigate how proximity issues can contribute to exploration and exploitation innovations. Studies were developed to highlight the relevance of the multidimensional proximity structure for the analysis of collaborative innovation processes (Balland, Boschma & Frenken, 2015; Broekel & Boschma, 2012). Based on these theoretical advances, it was concluded that geographical proximity alone is neither a necessary nor a sufficient condition for learning to occur (Boschma, 2021). Cognitive, organizational, social, and institutional proximity is also necessary to the knowledge and innovation exchange (Broekel & Boschma, 2012).

Geographical proximity, the most discussed in the literature dimension, denotes territorial, spatial, local, or physical proximity between agents (Knoben & Oerlemans, 2006). Cognitive proximity is defined as similarities in the way actors perceive, interpret, understand and evaluate the world (Nooteboom, 2000). Furthermore, a cognitive overlap is necessary for the transfer or creation of new knowledge between allies. In this sense, cognitive proximity is likely to increase knowledge transmission, where the knowledge base of partners expands and overlaps (Balland et al., 2015). Similarity in organizational purposes, roles, and experiences are characteristics of organizational proximity (Steinmo & Rasmussen, 2016). According to Boschma (2005), organizational proximity is defined as the extension of relationships in an organizational arrangement, both intra and inter-organizational, thus involving autonomy and the control degree control that can be exercised in arrangements. Institutional proximity describes the extent of standards, habits, rules, and laws between economic agents, involving both formal and informal institutional aspects (Knoben & Oerlemans, 2006). Thus, the sense of this dimension includes the idea of organizations that share the same institutional rules and set of cultural habits and values (Boschma, 2005). Social proximity, in turn, indicates personal or relational proximity between peers (Schamp, Rentmeister, & Lo, 2004). This dimension exists when there is trust based on friendship, relationship, and previous experience among the actors (Boschma, 2005).

Although these proximity aspects are useful for analyzing learning and innovation, the debate on proximity did not explicitly consider the complexity inherent in the use and transfer of knowledge in different contexts (Mattes, 2012; Balland et al., 2015). Based on an empirical study promoted by Davids and Frenken (2018), the authors proved the importance of each proximity dimension depending on the type of knowledge (analytical and synthetic) that is being mobilized and produced. The results indicate that although analytical knowledge can be effectively produced over long distances, high cognitive proximity is required. The same does not apply to synthetic knowledge, which generally requires permanent co-location to overcome the lack of cognitive proximity.

Considering only the geographic dimension, Martin and Moodysson (2013) revealed that the exchange of knowledge in geographic proximity is especially important for industries that depend on a synthetic knowledge base because the interpretation of the knowledge they deal with tends to be different depending on the location. When the knowledge base is analytical, the geographical factor is less sensitive, as it is a scientific, abstract, and universal knowledge.

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Therefore, the transfer of analytical knowledge is based on other reasons and not necessarily on the co-location of partners (Martin & Moodysson, 2013). Enkel and Heil (2014) not only focused on spatial distance, but also considered the cognitive proximity between partners to create potential absorptive capacity. The results highlighted that, when developing innovation for exploitation with long-distance partners, cognitive proximity is strengthened, also achieving exploration innovations (Enkel & Heil, 2014). Some studies have tried to understand the relationship of proximity at regional levels (Boschma, 2021). Thus, there is already confirmation that not only there is influence exerted by geographic proximity, but also that the technological similarity of the regions has a determining effect on the generation of innovations (Gonçalves & Fajardo, 2011).

The presented studies show that the role of proximity can change according to the orientation of innovation (Mattes, 2012; Steinmo & Rasmussen, 2016). However, the studies did not consider the multiple nature of proximity dimensions. If innovation for exploration allows the creation of new knowledge and exploitation supports the refinement and use of existing knowledge (March, 1991), it is expected that the established proximities will be different for different contexts. Finally, it was considered important to understand the complexity inherent to the knowledge transfer connected to the dimensions of proximity.

METHOD

For the population composition of this study, high technology companies were taken into account according to the OECD (Organization for Economic Co-operation and Development), aiming to find organizations with greater chances of innovation. In this way, companies from the information technology, pharmacochemical, and R&D sectors have participated. To select the companies that would be invited, the GPTW (Good Places to Work) classification was used, which provides the rank of companies by sector. Through LinkedIn, contact was made with innovation directors, coordinators or managers who were able to respond to the questionnaire, and only one representative per company was selected to participate. Despite these efforts, the sampling performed is considered non-probabilistic, that is, there is a dependence, in part, on the researcher's judgment for the selection of sample guests (Mattar, 2006).

As a data collection instrument, self-administered questionnaires were used, in which respondents assessed their level of agreement for each item using a five-point validated Likert scale, which ranges from "strongly disagree" to "strongly agree." The questionnaire was divided into four sections: i) Alliance context (Barbosa, 2018); ii) Proximities, in which cognitive and organizational proximity were investigated by five variables, and organizational and institutional proximity by four variables (Geldes, Heredia, Felzensztein & Mora, 2017); iii) Partnership innovation intention analyzed by 12 variables (Lubatkin, Simsek, Ling, & Veiga, 2006); iv) Characterization of the company and the interviewee. 174 validated questionnaires were collected from December/2019 to February/2020.

Despite the efforts to control common method bias, the results may still be susceptible to this problem. In order to test this possibility, the Harman one-factor test was performed by inserting all dependent and independent variables into an EFA (Exploratory Factor Analysis).

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Based on the Eigenvalue greater than one criterion, four factors emerged in the analyses, the first being responsible for only 30.57% of the explained variance (Tiwana, Jijie, Keil, & Ahluwalia, 2007). Therefore, there are no signs of serious problems. A CFA (Confirmatory Factor Analysis) version was performed, in which all items were allocated in a single factor that would represent all the effects of the method. The results confirmed the presence of the five proximities and the two innovations, with at least three items each and with Cronbach's α, which ranged between 0.538 and 0.812, acceptable values according to Hair et. al. (2012). The estimated correlations between these factors were all above 0.7, confirming the discriminant validity of the study's constructs.

From the survey, it was adopted the FsQCA (fuzzy-set Qualitative Comparative Analysis), which aims to analyze the configurational causality of relationships (Ragin, 2008). This method identifies configurations considering the principle of equifinality, observing different paths that lead to the same result, and asymmetry in relationships, in which the presence or absence of a causal condition can generate the same result (Ragin, 2008). In FsQCA, attributes (proximities in this study) and results (exploration and exploitation here) are seen as sets, in which each case can be a member, thus, a certain condition is necessary if, whenever the result is present, the condition is also present, that is, the result cannot be performed without the presence of the condition (Marx, Rihoux, & Ragin, 2014). A given condition or set of conditions is sufficient for a result when it, by itself, produces a given result (Marx et al., 2014).

To apply the FsQCA, initially, the data was calibrated to associate empirical information with pre-defined categories (Schneider & Wagemann, 2013). For the cognitive, social, organizational, institutional, and exploration and exploitation innovations constructs that were measured by the Likert scale, it was established that the original values 5 and 1 belong to the complete association (1.0) and non-complete association (0.0), respectively (Pickernell, Jones & Beynon, 2019). For geographic proximity: it was adopted that partners from the same state are fully associated (1.0), whereas partners that are within Brazil, but in different states, are cross associations (0.5), and international alliances are non-complete associations (0.0). A constant of 0.001 was added to all cross-associations (0.5) so that they were not automatically eliminated during the analysis.

During the analysis process, it is necessary to establish two parameters for calculating the solution: consistency and coverage. Consistency measures the degree to which a combination of causal conditions (solution) is reliably associated with the outcome of interest, that is, how much those settings have predictive power in the analysis (Fiss & Peer, 2011) and recommendations are that the results are close to 0.75 (Ragin, 2008), however, for large samples (greater than 50 cases) lower consistencies are accepted, as the possibility of inadequate case selection is minimized (Schneider & Wagemann, 2013). Coverage indicates the percentage of cases that follow a given recipe for the result (Fiss & Peer, 2011), or, in other words, exposes the number of cases that are explained by a given configuration (Ragin, 2008). Thus, in the present study, a consistency of 0.7 and a frequency of five cases per solution was adopted as a limitation. Finally, using the Quine-McCluskey algorithm, the output of the intermediate solution for the analyzes was obtained (Fiss, 2011).

RESULTS

In this section, data is presented and interpreted from the intermediate solution produced by the FsQCA software in Tables 1 and 2 of configurations. The consistency of the configurations ranged between 0.89 and 0.93, which are values close to those practiced in other studies, such as Alves, Ficher, Vonortas and Queiroz (2018) and Fiss (2011). The raw coverage found in the configurations are between 0.4 and 0.61 values, which are results similar to those practiced in Pickernell et al. (2019).

We start the analysis by presenting the proximity settings for the innovation outcome alliances for exploration in Table 1.

Table 1. Sufficient configurations for Exploration

Outcome	Exploration		
Configurations	1	2	3
Geographic	●	●	
Cognitive		⬤	⬤
Social	●	●	●
Organizational			●
Institutional	⬤		⬤
Consistency	0.92	0.91	0.93
Raw coverage	0.58	0.60	0.55
Unique coverage	0.05	0.07	0.08
Overall consistency of the solution	0.73		
Overall coverage of the solution	0.89		

Notes:
⬤ =presence of an essential condition; ● =presence of peripheral condition; ⊗ =absence. Blank spaces indicate "irrelevant".
Real parameters adopted: raw coverage=0.93; PRI consistency=0.83.

Configuration 1 brings institutional proximity as central, supported by the geographical and social as periphery. This first configuration allows us to reflect on the relevance of the similarity of regulations, culture, values and habits between the allies for achieving radical results. Companies that seek innovation strategies for exploration take more risks, invest more in research, experimentation, and discovery (March, 1991) and tend to have culture, values, and regulations aimed at more aggressive R&D practices (Jansen et al., 2009). In addition to institutional proximity, social proximity is needed. Friendship, trust, reputation, and previous relationships play an important role in minimizing opportunistic behavior through the intensification of personal relationships (Gulati, 1995). There is also the presence of geographic proximity. Being physically close favors more frequent face-to-face contacts, therefore, facilitates knowledge sharing. It is important to highlight that this is a configuration in which organizational and cognitive proximity are irrelevant. Thus, it is often observed that it is neither rigid contractual bonds nor the overlapping of the knowledge base that guarantee the success of a partnership, but trustworthy social relations, face-to-face contact, and alignment of institutional values.

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In Configuration 2, cognitive proximity appears as a central condition, and geographic and social proximity as peripheral. In this configuration, which seeks to extrapolate existing fields of knowledge and propose radical innovations (Lubatkin et al., 2006), there is a central need for a common knowledge base, technologies, and experiences in the area. Social and geographic proximity are also needed. Social proximity, once again, has been strengthening the relationship through trust and friendship (Molina-Morales, Belso-Martínez, Más-Verdú, & Martínez-Cháfer, 2015). With this, it is inferred that even though two partners have a solid and aligned knowledge base, if there is no personal relationship between them, the innovation for exploration will not occur. Finally, the physical proximity between those in line ensures greater frequency of face-to-face meetings, increasing the connection of those involved.

When comparing Configurations 1 and 2, a substitution relationship between institutional and cognitive proximity is observed. When there is cognitive proximity, there is no mandatory presence of the institutional dimension and the reciprocal is true, considering that they are geographically close cases and with irrelevance of organizational proximity. The opposite scenario also favors innovation for exploration. In partnerships where there is institutional proximity, the obligatory existence of overlapping knowledge between the partners is minimized.

Configuration 3 is the most traditional and supports preliminary discussions of the proximity approach (Boshma, 2005). According to this configuration, when there is cognitive, social, institutional, and organizational proximity, the geographical becomes indifferent, that is, no matter where the partner is positioned, the result of innovation will be achieved. Interestingly, geographic proximity only presents itself as irrelevant when there is proximity in all other dimensions.

For exploitation innovations, there are two configurations of "neutral permutations," that is, the solutions share the same central condition and differ in their peripheral conditions, therefore, the nomenclature of the configurations is 1A and 1B in Table 2.

Table 2. Sufficient configurations for Exploitation

Outcome	**Exploitation**	
Configurations	1A	1B
Geographic		●
Cognitive	⬤	⬤
Social	●	●
Organizational	●	⊗
Institutional	●	
Consistency	0.89	0.91
Raw coverage	0.61	0.40
Unique coverage	0.29	0.07
Overall consistency of the solution	0.88	
Overall coverage of the solution	0.69	

Notes:
⬤ =presence of an essential condition; ● =presence of peripheral condition; ⊗ =absence. Blank spaces indicate "irrelevant".
Real parameters adopted: raw consistency=0.89; PRI consistency=0.75.

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Configuration 1A is formed by central cognitive proximity, combined with peripheral social, organizational, and institutional dimensions. Even for incremental innovations, focused on improvements and based on existing knowledge (Lubatkin et al., 2006), cognitive proximity stood out. This first configuration evidence that allies need similarity in the knowledge base, common technological experiences, and overlapping competences for exploitation. Once again, the social proximity that permeates relationships and favors the achievement of results is seen. The congruence of institutional intentions is also important. Organizational proximity plays a relevant role, in which the presence of a command structure can facilitate the achievement of incremental results. Geographic proximity is irrelevant, meaning partners can be geographically close or distant. Based on this configuration, it can be concluded that when there is proximity in all non-geographic dimensions, it does not matter the location of the partner, as the innovation for *exploitation* will be achieved.

In Configuration 1B, it is observed that when there is geographic proximity, cognitive and social proximity are necessary, in addition to the absence of organizational proximity. Cognitive proximity, once again, is central to exploitation relationships. Social proximity was presented as a peripheral factor, but relevant for all exploitation configurations. The highlight aspect of Configuration 1B is the absence of organizational dimension. If organizational proximity is related to the command structure, autonomy and regulation of the relationship, the absence of this dimension points to the reflection that partnerships with rigid command structures will hardly be able to innovate together incrementally. Thus, for co-located firms, a softer command relationship will more effectively ensure short-term incremental innovation results.

Comparing configurations 1A and 1B in Table 2, it is noted that when there is geographic proximity, the alliance is based on less formal aspects, such as friendship, trust, previous experiences, technical language, and presence, highlighted by the dimensions of Configuration 1B. When there is the possibility of physical distance, (Configuration 1A), in addition to these proximities, more formal structural aspects are needed, such as regulations, organizational structure, cultural and values alignment.

Regarding the need analysis, which seeks to identify whether the causes separately are necessary for the result, that is, if a certain condition needs to be present for the result to happen (Fiss, 2011), only social proximity presented a relevant need factor (0.9 threshold), both for the exploitation and exploration occurrence. This result was already expected, as this dimension was present in all configuration results. However, despite the fact that social proximity is fundamental for achieving innovation results, it is not a sufficient condition, since in no configuration it was able to generate innovation results alone.

DISCUSSION AND IMPLICATIONS

In highly dynamic environments and with alliances that have different characteristics, it is very limited to consider that all relationships rely on the same proximity aspects to develop innovation for exploration and exploitation. The results highlighted that it is the combination

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of proximities, that is, their interrelationship, that guide different innovation purposes. Thus, the study contributes with four advances in literature.

Firstly, there is not only one 'prescription' of proximity for alliances that want to innovate, thus, depending on the context, partners can seek closer relationships in different dimensions. The results showed that exploration alliances can rely on three proximity combinations. When there is geographic proximity, indispensably, the alliance needs cognitive and social proximity or institutional and social proximity for the result to be achieved. On the other hand, in a geographic distance context, social, cognitive, organizational, and institutional dimensions need to be present. Innovation alliances for exploitation, in turn, are characterized by two configurations: when there is an absence of geographic proximity, it is necessary to align social, cognitive, institutional, and organizational proximity; when the relationship is geographically close, social and cognitive proximity is necessary, with an absence of organizational proximity.

These results show, therefore, that there is not only one way to achieve innovation results. From these resulting combinations, it is observed that the only configuration that was present in both types of innovation is the one that combines geographic distance with all other non-geographic proximities studied. Companies seeking to design ambidexterity strategies, that is, seeking to develop exploitation strategies to ensure current viability and, at the same time, invest in exploration in order to achieve future viability, must develop all non-geographic proximities (cognitive, social, organizational and institutional), regardless of the partner location.

Secondly, there is an interrelationship between proximities, that is, none of the dimensions is sufficient on its own, since in all configurations, at least three proximities are necessary for the effectiveness of the result. Furthermore, it is concluded that there is a relational asymmetry, in which not necessarily all five proximities need to be present for the positive innovation performance, comparing the preliminary proximity studies (Boschma, 2005; Knoben & Oerlemans, 2006), which highlighted the importance of many proximities. The configurations that present irrelevant dimensions or, still, in the configuration of exploitation alliances, in which the absence of organizational proximity is necessary are evidence of this. Therefore, analyzing the proximities considering only the net effect of the regression, as previously pointed out by Geldes et al. (2017) and Hansen (2014), may be limited as it does not consider a relational perspective of dimensions. A methodological technique such as fQCA may be more suitable for studying organizational configurations and equifinality, in which there are several possible paths to achieve the same desired end result (Fiss & Peer, 2011).

In addition to analyzing proximities in a configurational way, one of the purposes of this study was to investigate whether the proximities change according to the alliance's innovation orientation. The in-depth analysis of these results regarding the relationships of each dimension with the type of innovation (exploit or explore) enables advances in the current knowledge on the subject. Regarding cognitive dimension, a certain absence of this proximity in exploration alliances was expected, as some studies indicate that for the creation of new knowledge, a certain degree of dissimilarity between agents is important, that is, low cognitive proximity (Boschma, 2005 ; Huber, 2011).

However, of the three exploration configurations, two presented cognitive proximity as central. This shows that radical innovations can be achieved even when there is an overlap of knowledge between partners, not depending just on access to new sources of knowledge. Despite the surprising result, there is support in a study on university-industry partnerships that highlights the importance of cognitive proximity for innovation as a substitute for geographic proximity, that is, when partners are geographically distant, cognitive proximity overcomes physical distance barriers for radical innovations (Garcia, Araujo, Mascarini, Gomes dos Santos, & Costa, 2018). Alternatively, this result can be explained by the interrelationship between proximities, since intense (social) contact is essential for the development of mutual (cognitive) understanding between companies and their university partners (Lauvås & Steinmo, 2019). When it comes to innovation for exploitation, results were congruent with those highlighted in the studies by Hansen (2014) and Huber (2011), in which the need for cognitive proximity is pointed out, so that results can be achieved in a shorter period of time. These positive results from collaboration with cognitively close sources are observed for both product and process innovation (O'Connor, Doran, & McCarthy, 2020). Therefore, as expected, in all configurations in the innovation alliances for exploitation, cognitive proximity is central (Huber, 2011).

There was also a substitution relationship between cognitive and institutional proximity in exploration alliances. It is interesting to note that cultural, habit, and value differences (institutional) can be overcome by an alignment in the knowledge base (cognitive). Somehow, this result corroborates what was observed by Broekel (2015), who shows, in the long term (usually necessary for innovation in exploration), cognitive and institutional proximities co-evolving, as institutional changes generate cognitive changes in organizations. The opposite scenario also favors innovation for exploration, in partnerships where there is institutional proximity, the mandatory existence of overlapping knowledge between partners is minimized.

Organizational proximity proved to be irrelevant for innovation for both exploration and exploitation when partners are physically close and there is the presence of other dimensions. The highlight is the requirement for the absence of organizational dimension for innovation for exploitation, in a geographic, cognitive and social proximity context. This result confirms that in exploitation alliances, having an accentuated command line hinders the achievement of innovation results, so an autonomous relationship between parties is more appropriate (Gonzales & Melo, 2018). Additionally, organizational proximity was only necessary when geographic proximity appeared to be irrelevant. This solution is consistent with the study by Hansen and Mattes (2018), who emphasize that when there is greater autonomy among those involved, there is less dependence on physical proximity. In this scenario, the relationship of control and autonomy needs to be better defined, regardless of the desired innovation results.

The third contribution is the emphasis that social proximity had in the configurations obtained in this research. Social proximity was expected to be present in exploit relationships, based on already consolidated knowledge, as pointed out by Steinmo & Rasmussen (2016), or even only when the allies were geographically close, according to Huber (2011). However, the results highlight that trust, friendship ties, and prior relationships are important in all proximity

configurations, both for exploration and exploitation. By establishing personal relationships of trust, cultural differences, rules and work models are more easily understood and overcome. Furthermore, when there is trust between the partners, the chance of important information being inappropriately disclosed is reduced (Molina-Morales, 2015). Although no proximity alone is enough, social proximity was the only causality dimension identified as necessary to achieve performances, that is, any alliance needs to create and foster social ties between those involved.

Although some studies already recognize the importance of social proximity for innovation, the geography of social networks and the way they contribute to the strengthening of innovation are still little explored, especially in developing countries (Xu, Yang & Xue, 2019). The present study advances in literature by analyzing the social dimension in geographically distant and close relationships, from the perspective of companies predominantly based in Brazil. The traditional view of territorial innovation models states that spatial proximity is highly related to social proximity, to the fact that the first facilitates the second (Boschma, 2005) or almost automatically leads to it (Huber, 2011). Nevertheless, results point to the construction of social proximity both in close and physically distant relationships. This highlights the fact that social proximity can be maintained over long distances and does not require permanent spatial proximity.

Finally, the fourth contribution is related to geographic proximity. Studies inspired by economic geography share the emphasis that companies' innovative activities show a "spatial adherence" and, for this reason, location is a primary determinant of the competencies that an alliance possesses (Iammarino & McCann, 2006). Hinzmann, Cantner and Graf. (2019) even show that the need for geographic proximity increases when knowledge is new, and the innovation effort is more radical (exploration). Because of this evidence, much research has focused on investigating only the effects of physical proximity on relationships (Bishop, D'Este & Neely, 2011; Huber, 2011). However, the results show that the spatial distance of the allies is not an impediment to exploration and exploitation innovations. The findings even reinforce that the role of geographic proximity is peripheral in alliances.

Thus, the concern with the lack of face-to-face contact can be minimized as long as cognitive, institutional, social, and organizational proximities are present. Therefore, it becomes evident that analyzing alliances exclusively from a geographic perspective is not enough, as organizations need to pay more attention to establishing and intensifying non-geographic proximities so that innovation can happen. Added to this, preliminary studies have already highlighted that geographic proximity acts as a facilitator of other dimensions (Boschma, 2005; Hansen, 2015; Mattes, 2012). Therefore, the statements are reinforced, since in configurations where there is geographic proximity, there was a need for a smaller number of non-geographic proximity. In fact, when partners are physically close, allies need to be less concerned about fostering all proximities, although at least two more dimensions are required, depending on the innovation motivation.

As managerial implications, we highlighted that for alliances to reach their innovation goals, proximity between partners is necessary. There is no need for proximity in all dimensions, but it is important to have a combination of at least three distinct proximities, depending on the desired innovative orientation. Thus, preventively, allies can investigate the existing proximities even before establishing the alliance. In short, in alliances where those involved do not have

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a minimum of proximity, it will be difficult to achieve innovation results. The opposite is also true, companies do not necessarily need to have proximity in all dimensions to have a successful partnership. It also reinforces the importance of companies to build social networks, since innovation results will hardly be achieved by the alliance if there is no social proximity.

When there is social proximity, many barriers to innovation are minimized, since trust sometimes transposes the mechanisms of legal regulation, lack of cultural alignment, and even the absence of overlapping knowledge. Finally, we highlight that geographic positioning is irrelevant, as long as there are other proximities between the allies, reducing the importance given by many entrepreneurs in seeking co-located partners.

CONCLUSION

Throughout this study, an investigation of the influence of proximities on innovation alliances for exploration and exploitation was carried out. This study premise was that the proximity between partners is important for innovation, but it is the combination of them that will lead to different results. We observed that proximity is not necessary in all dimensions for the achievement of innovation results, as the distance in one dimension can be compensated by the existence of proximity in others, however, no isolated proximity is able to promote innovation alliances.

We concluded that proximities influence in different ways the alliances' innovation orientation. In the context of physically close partners, exploration alliances are dependent on social proximity, combined with cognitive or institutional proximity. The exploitation alliances, on the other hand, are dependent on cognitive and social proximity, added to the absence of organizational proximity. It is noteworthy that when geographic proximity is irrelevant, all non-geographic proximity dimensions are necessary for both exploration and exploitation. These findings reinforce that geographic proximity is a facilitator for reaching innovation, but being physically distant is not an impediment for innovating, as long as there are other proximities present. Finally, it is worth to highlight the relevance of social proximity in alliances. This is indispensable in all configurations, without trust, no alliance will achieve its goals. Therefore, it is evident that close personal relationships can serve as efficient strategies for crossing boundaries in the knowledge base, command line, cultural alignment, and even physically distant relationships.

As theoretical implications, there are advances with the studies of alliances, highlighting that geographic proximity is less relevant than what studies in the area suggest and that the focus of the alliances analysis should be the non-geographic proximities. As managerial contributions, we noted that at least three proximities are necessary for the exploration and exploitation alliances to carry out. It is reinforced that geographic distance is not a barrier to the alliance relationship and that the focus must be given to social, institutional, cognitive, and organizational alignment. Finally, entrepreneurs and managers seeking to build alliances for exploration and exploitation innovations should strengthen their social networks, as this is an indispensable dimension for any relationship and, also, it is a decisive factor for the beginning of the alliance.

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This research has limitations that may lead to further improvements. A methodological limitation is related to analyzing the results of the alliance considering only the perspective of one of the partners. Thus, we suggest, for future research, analyzing the innovation perspective of everyone involved in the alliance. Another limitation is related to the investigation of innovation projects in dyad; however, the company can develop other proximity mechanisms with other partners, which were not considered. Further analysis of the proximity aspects considering the company's network can be a great contribution. Finally, geographic proximity was investigated considering national and international relationships. Considering that the results suggest an irrelevance of this matter, future research can advance in literature analyzing a geographic dimension within a same country.

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AUTHORS' CONTRIBUTIONS

Jessâmine Salvini and Simone Galina worked on the conceptualization and theoretical-methodological approach. The theoretical review was conducted by author Jessâmine Salvini, with support and guidance from author Simone Galina. Data collection was coordinated by Jessâmine Salvini. Finally, the authors Jessâmine Salvini and Simone Galina participated in the data analysis. All authors participated in the writing and final review of the manuscript.

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CREATIVITY AS PRACTICE: PERSPECTIVES AND CHALLENGES FOR RESEARCH ON MANAGEMENT

Criatividade como prática: Perspectivas e desafios para a pesquisa em administração

Creatividad como práctica: Perspectivas y desafíos para la investigación en Administración

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ABSTRACT

Creativity is a precursor to innovation in contemporary organizations, economies and societies. However, we still lack an integrated and updated knowledge about academic production on creativity, due to the dispersion of existing approaches and the deviation with the epistemology of practice. The research goal is to map and integrate the academic production on organizational creativity, proposing their conceptual renewal from the epistemology of practice. The research method is based on survey and analysis of national and international academic productions on organizational creativity and epistemology of practice. The results consist in a set of categories of the creativity conceptions that allows an integration of research on management research and a structured proposal for renewing the conceptualization of creativity from the epistemology of practice. The results contribute to the advancement of creativity research in elaboration of an integrated set of conceptions of organizational creativity and articulation of creativity with the perspective of practice, expanding the understanding of the concept and proposing a conceptual and theoretical path for renewing and feeding future research.

Keywords: creativity, practice, epistemology of practice, management, organizational studies.

RESUMO

A criatividade é precursora de inovação nas organizações, economias e sociedades contemporâneas. Entretanto, é necessário o conhecimento integrado e atualizado sobre a produção acadêmica, devido à dispersão de enfoques existentes e ao desengajamento com a epistemologia da prática. O objetivo desta pesquisa consiste em mapear e integrar a produção acadêmica sobre criatividade organizacional, propondo sua renovação conceitual com base na epistemologia da prática. O método é baseado em levantamento e análise da produção acadêmica nacional e internacional sobre criatividade organizacional e epistemologia da prática. Os resultados consistem em um conjunto de categorias de concepções da criatividade que permite integrar as pesquisas em Administração e uma proposta estruturada de renovação conceitual a partir da epistemologia da prática. Os resultados contribuem para o avanço da pesquisa em criatividade com a elaboração de um conjunto integrado de concepções sobre a criatividade organizacional e a articulação da criatividade com a perspectiva da prática, ampliando a compreensão do conceito e propondo um caminho conceitual-teórico para renovar e alimentar pesquisas futuras.

Palavras-chave: *criatividade, prática, epistemologia da prática, administração, estudos organizacionais.*

RESUMEN

La creatividad es precursora de innovación en las organizaciones, economías y sociedades contemporáneas. Pero aún necesitamos un conocimiento integrado y actualizado sobre la producción académica, debido a la dispersión de los enfoques existentes y la desvinculación con la epistemología de la práctica. El objetivo de esta investigación es mapear e integrar la producción académica sobre creatividad organizacional, proponiendo su renovación conceptual desde la epistemología de la práctica. El método de investigación se basa en el relevamiento y análisis de la producción académica nacional e internacional sobre creatividad organizacional y epistemología de la práctica. Los resultados consisten en un conjunto de categorías de las concepciones de la creatividad que permite la integración de la investigación en la Administración y una propuesta estructurada de renovación conceptual desde la epistemología de la práctica. Los resultados contribuyen al avance de la investigación mediante la elaboración de un conjunto integrado de concepciones de la creatividad organizacional y articulación de la creatividad con la perspectiva de la práctica, lo que amplía la comprensión del concepto y propone un camino teórico-conceptual para renovar y alimentar futuras investigaciones.

Palabras clave: *creatividad; práctica; epistemología de la práctica; administración, estudios organizacionales.*

INTRODUCTION

Creativity is a topic that raises growing and multiple interests in different fields of knowledge (Coldevin, Carlsen, Clegg, Pitsis, & Antonacopoulou, 2019; Coutu, 2008; Muzzio, 2019; Rickards, Runco, & Moger, 2009). Considered a core competence of the 21st century, as it expresses human potential in different contexts, creativity is essential for innovation, entrepreneurship, creative leadership, and the economic and sustainable development of organizations and societies (Nakano & Wechsler, 2018; United Nations Educational, Scientific and Cultural Organization [Unesco], 2015). Within an ecosystem of artistic and creative sectors (such as design, fashion, audiovisual production, games, films, and series), creativity is a vital and driving force for the socioeconomic development of contemporary societies guided by the creative and cultural economy (Bandeira & Costa, 2015; Bendassoli, Wood, Kirshbaum, & Cunha, 2009; Hartley, Wen, & Li, 2015; Muzzio, 2019; Townley, Roscoe, & Searle, 2019).

In the field of management, research on creativity has intensified in the last two decades. Initially, research focused on creativity based on the characteristics of inventive individuals, the influence of the work environment, and the interactions between individual, group, and organization (Amabile, 2017; Bruno-Faria, Veiga, & Macedo, 2008; Slavich & Svejenova, 2016; Styhre, 2006). Advocating creative leadership, organizational innovation, and the ability to formulate new solutions to both preexisting and emerging problems, some studies address creativity via skills, resources, and management of motivation to innovate (Bruno-Faria et al., 2008; Coldevin et al., 2019; Edmonson, 2012). Several studies address creativity as an individual, cognitive, personality, and environmental issue (Amabile, 2017; Mainemelis, Epitropaki, & Kark, 2019; Muzzio, 2019; Slavich & Svejenova, 2016; Sparadi & Nakano, 2015; Styhre, 2006).

Within a variety of themes and approaches, research on creativity does not focus on a single homogeneous definition. For some authors, creativity refers to the creation of ideas to be judged in a sociocultural environment according to their usefulness and originality (Amabile, 1996; George, 2007). For other research, creativity involves the interaction between motivation, intentions, and the ability to transform received sensory information into original interpretations in a given context (Csikszentmihalyi, 1997). In some studies, creativity is conceived as a disruptive potential (Styhre, 2006) or as a process that results in the emergence of a new product (goods or services), accepted as useful, satisfactory or valuable (Alencar, 1995; Amabile, 2017). There are several definitions of creativity within the scope of research on Management, and few studies have proposed to reflect on this conceptual variety seeking an integrated vision.

Furthermore, one theoretical-epistemological renovation has not fully reached the field of research on creativity in management: practice-based studies (PBS). In organizational studies (OS), the so-called "practice turn" gains strength by favoring situated and active action. Practice-based theorizing is based on the definition of practice as "knowable collective performance" and on a theorizing activity as practice situated within a collectivity that socially sustains it (Gherardi & Strati, 2014). We propose this practice as a theoretical, ontological, and epistemological lens for enabling us to understand organizational phenomena as a dynamic and carried out in current and

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daily actions. Based on this perspective, we seek to better understand the mutually constitutive ways that shapes agency, but also produces, reinforces, and changes its structural conditions (Feldman & Orlikowski, 2011). PBS allow for the formation of socially constructed knowledge based on the social immersion of organizational practices and the action between subjects and objects (Yanow, 2001). PBS stand out in OS due to the need to renew the understanding of social and organizational phenomena and interactions, assuming their inherent pluralities (Nicolini, 2012; Schatzki, 2001) as subjective, tacit, and aesthetic aspects (Bispo, 2015; Gherardi, 2019; Gherardi & Nicolini, 2000).

Developing a conception of creativity as practice enables the articulation of creativity with practice, contributing to better respond to the organizational need for constant adaptation, collaboration, innovation, and reinvention. This is an approach that helps to renew both the research activity and the practice of Management, impacting educational and professional improvement. Managers, leaders, and entrepreneurs are expected to be able to collectively practice creativity in the search and implementation of effective and innovative solutions to diverse problems, conflict resolution, and collaborative teamwork (Edmonson, 2012; Mainemelis et al., 2019; Sawyer, 2007). The alignment between creativity and PBS can contribute toward this.

Despite the potential contribution of PBS toward advancing research on creativity, we lack research relating organizational creativity to PBS (Coldevin et al., 2019; Garcia-Lorenzo, Donnelly, Sell-Trujillo, & Imas, 2018; Hjorth, 2018; Hjorth, Strati, Dodd, & Weik, 2018). Therefore, we faced two important gaps in research on creativity in Management (a) a broad, diverse, and integrated understanding of academic production; and (b) theoretical updating and renewal of research based on PBS.

This research aims to map and to integrate the academic production on organizational creativity to propose its conceptual renewal based on the epistemology of practice. Our methodology is based on theoretical research of a qualitative nature. We conducted a systematic review of the existing academic productions in the fields of research on organizational creativity and PBS. Our search was made by cross-referencing the following descriptors in English and Portuguese: creativity, creative, Management, organization, and practice. The databases consulted were: Academy of Management, Amazon, Emerald, JSTOR, Library of Congress, CAPES Periodicals, Routledge, Sage Publication Journals, SCIELO, and SPELL. From the first stage of selection (consistent and coherent productions dealing with creativity in Management) and the analysis of this material, we mapped its references, aiming to identify other relevant productions. The result was a set of articles, books, book chapters, theses, and dissertations.

The analysis of academic production made it possible to identify, to highlight, and to characterize contemporary conceptions of creativity. In the first section of this study, our analysis highlights the centrality of process logic and enables the categorization of four conceptions of creativity: processes of engagement, sharing, and social and discursive interactions. In the following section, we mobilize the academic production on PBS to develop a conceptual-theoretical path that (a) broadens the understanding of creativity and (b) guides and renews future research on creativity in management. In the set of results, our contribution to the

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advancement of research on creativity in management occurs, at least, in two ways. Firstly, this study provides an up-to-date and integrated understanding of the academic production on organizational creativity. Secondly, we propose an articulation of research on creativity with PBS.

CREATIVITY AS A PROCESS: CONTEMPORARY CONCEPTIONS IN MANAGEMENT

In the analyzed research, contemporary conceptions are developed around the idea of process. Although we find a variety of contemporary conceptions of creativity in the academic production on Management, creativity as a process is the point of convergence among all of them. Before diving into these concepts, let us understand their production context.

Traditionally, the concept of creativity in research on management is guided by the focus on the individual at the center of creative activity. Originating from Psychology in the 1950s, creativity would arise from unconscious impulses (Guilford, 1950; Runco & Sakamoto, 1999) and develop itself as a thinking skill, a product of creative thinking or personal qualities (Csikszentmihalyi, 1997; Sternberg, 1999). In the following decade, the four Ps (person, process, product, and environmental pressure) began to be covered by research investigating the characteristics of creative people, creative processes, and the effect of the environment on successful creations (Choi, Glaveanu, & Kaufman, 2020). From the 1970s onward, research began to focus on the situational aspects that permeate the acquisition of creativity as a skill, detailing the constitutive stages of learning, such as cognition, retention, and memory. In the 1980s, a sociocultural approach (of eminently collective and shared social constructions) emerged. In these studies, creativity is conceived as connected and heterogeneous practices that shape daily work and whose creation practices are influenced by context (Garcia-Lorenzo et al., 2018).

From the 2000s onward, research continues to define creativity as based on social and sharing aspects in an ever-changing dynamic (Choi et al., 2020; Glaveanu, 2014), considering the social connections of a creative individual. Thus, contemporary conceptions of creativity contemplate greater diversity and complexity, encompassing arts, socio-historical views, group interactions, knowledge, and emotions (Glaveanu, 2010a, 2014, 2017; Mainemelis, 2010). With the advent of sociocultural contribution, the 4-Ps creative model is transformed into the 5-A framework. Thus, research talks about actors (instead of persons), actions (instead of processes), artifacts (instead of products), access (rather than environmental pressure), and an audience (e.g., target audiences) made up of both those who provide guidance and feedback and those who interact with the final product (Choi et al., 2020).

Contemporary conceptions of creativity consider that creativity occurs in a process and at different levels, from the cognitive to the interactional process. These are conceptions that bring together the involvement of individuals in their creative work processes, social interactions, search for new solutions, and in the characteristics demanded at different stages of the creative process (George, 2007; Slavich & Svejenova, 2016; Zhou & Shalley, 2003). This is a process that occurs

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in everyday life and includes relations of performance and interpretation. Thus, creativity is perceived as a continuous and interdependent generating process between subjects and their sociocultural context via the adaptive and fluid nature of everyday practices in organizational processes (Garcia-Lorenzo et al., 2018; Hjorth et al., 2018).

In contemporary conceptions of creativity, many studies highlight the environment as a central element to explain favorable conditions for the creativity process. For example, mentioning conditions such as support in managerial practices, supervision, assignment of challenging tasks, job characteristics, integration of diverse profiles, adequate project management, a collaborative environment, acceptance of failures, unbureaucratic structures, provision of adequate resources, and availability of time and personnel (Coutu, 2008; Shalley, Zou, & Oldham, 2004; Slavich & Svejenova, 2016; Zhou & Shalley, 2003). The contextual characteristics of the creative process refer to managerial practices aimed at team development (Amabile, 1999). Among these teams, traits and behaviors associated with dominant cultural groups are no longer considered generalizable, resulting in a broadening of focus from an elitist or culturally dominant perspective toward a greater diversity of cultural, ethnic, and social class groups (Sawyer, 2017).

On the other hand, research indicates unfavorable aspects for the creativity process: assignment of inadequate work, change or lack of clear definition of objectives, false or impossible deadlines, and lack of verbal and direct incentives for creative efforts (Amabile, 1999). Research also mentions barriers of a perceptual, cultural, emotional (Alencar, 1995), environmental, intellectual, expressive (Jones, 1993), and strategic nature in addition to issues of value and self-image (Rickards & Jones, 1991). Other obstacles to the creative process in organizations are related to behavioral traits, such as fear of making mistakes, taking risks, exposing ideas, and insecurity or feelings of inferiority (Edmonson, 2012). These behaviors originate from a repressive education which would reflect social values and assumptions by emphasizing incompetence and incapacity instead of potential (Alencar, 1995, 2007).

In short, the interpretation of creativity as a process understands that creativity occurs in stages. Procedural logic provides a language and concepts to describe a world in formation in which creation is seen as immanent to organization (Hjorth et al., 2018). Focusing on creativity as a process makes it possible to understand how the environment supports practices that encourage new actions and forms of organization (Garcia-Lorenzo et al., 2018). It is a concept that is concerned with understanding how new ideas are generated along a temporal continuum, with the mobilization of structures and processes both social and organizational.

Creativity as a process refers to both an attribute and a process which develop themselves at individual and social levels (Masi, 2003; Pinheiro, 2009). The creative process is described as a way of explaining and describing how something innovative is created (Alencar, Fleith, & Bruno-Faria, 2010; Spadari & Nakano, 2015). This process is based on two concepts: (a) traditional learning, such as the formation of new learners, in which the process of learning to perform a task is easily observable (Collins et al., 1990); and (b) cognitive learning, which occurs in the classroom and where thinking is deliberately stimulated by the teacher (Collins, 2007; Collins et al., 1990; Lins & Miyata, 2008).

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The creative process arises from the attempt and need to relate fantasy and concreteness as the two factors that generate human creativity (Masi, 2003). Rational resources are considered propellers of the creative process which enable the creation of creative synapses and new concepts. Also called the work on ideas, this process of development and legitimation is not limited to particular stages, as it takes place in practices of continuous generation, connection, communication, evaluation, and remodeling (Coldevin et al., 2019).

In managing the creative process, internal processes are interconnected: processes-outcomes, individuals-collectives, and temporary-permanent units of creativity (Slavich & Svejenova, 2016). Indeed, the creative process does not occur in a linear, organized or systematic way, its development can be influenced by the environment, and challenges can appear at each stage of its course and to the cognitive action of the creator (Goleman, Kaufman, & Ray, 1992; Mainemelis, 2010). Research seeks to broaden the understanding of creative action as a process that begins at a point (an initial problem) to include its definition, context, and the subsequent joint evaluation of the creative solutions that are proposed throughout the process (Lombardo & Kvålshaugen, 2014). Thus, the actors involved in the process produce creative solutions that are incorporated into the initial solution.

The analysis of academic production on organizational creativity allows us to highlight at least four major contemporary conceptual axes of creativity as a process: (a) engagement, (b) sharing, (c) social interaction, and (d) discursive. The concept of engagement emphasizes the individual and psychological dimensions of the creative process, whereas the concept of sharing advances in the inclusion of concerns with relational and cultural issues of the creative process. In the conception of social interaction, contexts and social systems are decisive for understanding the creative process, whereas the discursive conception expands the understanding of this process by focusing on its political and identitary dimension.

Engagement process

Based on perspective of engagement, creativity is linked to a process of individual and/or collective commitment. At the individual level, engagement refers to a positive, rewarding, work-related state of mind characterized by dedication and self-efficacy (Slavich & Svejenova, 2016). For example, Drazin, Glynn, and Kazanjian (1999) define creativity as a process of involving an individual in a creative task, or even a process in which the individual engages—behaviorally, cognitively, and emotionally—in producing results. Creativity, therefore, reflects the individual's choice to engage in creative processes and seek new ideas.

While individuals can commit, dedicating all their skills to creative processes, they can also choose the minimum engagement, proposing simple solutions that may not be particularly new, called by Ford (1996) as habitual action. These engagement and disengagement processes can vary over time, ebb and flow over the day. For Csikszentmihalyi (1997), creativity is intrinsically related to states of motivation in which elements such as interpersonal support and organizational culture

help to contribute to states of engagement and flow. The flow or creative process experience is characterized as the moment or sequence that requires a certain degree of emotional sensitivity to capture the inherent characteristics of knowledge in action (Chia, 2003; Csikszentmihalyi, 1997). It is a state of optimized experience that is a precondition for full involvement in a task. Being in the flow helps to deal with the unpredictability of creative efforts or "out-of-the-box connections," making it possible to achieve high standard commitment and creativity.

Sharing process

The conception of creativity as a shared process understands that distributed or shared creativity is an activity that occurs in an eminently relational, collective, and interactional way between groups (Bureau & Komporozos-Athanasiou, 2016; Mainemelis, Kark, & Epitropaki, 2015). The social, material, and temporal dimensions of creativity are considered, as well as the interconnection of cognitive, cultural, and social processes. This turn stems from the recent disassociation of forms of creativity associated or restricted to the upper, academic or art classes (Sawyer, 2017) toward the assumption of collective forms of creativity arising from the working classes or creative individuals who lacked access to higher education. Sharing creativity, therefore, is as likely to occur among the most diverse professionals in organizations as it is in their highest levels and chairs.

Among the harmful factors to the climate conducive to the process of sharing ideas are: (a) lack of attention or skill; (b) deliberate violation of agreed rules; and (c) insecurity and adoption of inadequate processes. Some strategies help to curb the harmful factors to creativity: (a) the proper diagnosis of challenges or goals; (b) the initial design of shares; (c) decision-making (experimental and effective); and (d) permanent reflection on the results and progress obtained throughout the process (Edmonson, 2012). These strategies promote a psychologically safe and favorable environment for learning, expressing, and admitting failures (West & Sacramento, 2012).

The relationships of sharing creativity in a given community vary according to the nature of the interaction between individuals. Creativity is possible according to the existence of material and psychological conditions suitable for its development (Vygostsky, 1991). The development of creativity is then externally focused on the mental activity of each individual, extending through the external means of action and communication (Glaveanu, 2014, 2019). Thus, creativity is not a static "object" (personal or product characteristics), but rather the dynamic and evolving quality of relationships developed collectively within a shared cultural environment.

In research on creative leadership, practices favoring the achievement of creative results stand out: encouraging expression and sharing between teams, materializing the creative vision on the part of the leader, and integrating heterogeneous creative contributions (Mainemelis et al., 2019; Muzzio, 2019; Raelin, 2018). On the other hand, when considering the implications of multi-contextual structures of creative leadership, three critical contextual issues must be addressed: unclear definitions, lack of subtle theories, and low contextual sensitivity (Mainemelis et al., 2019). Indeed, the leader's role in managing shared creativity encompasses both instrumental competences of reflection, goal setting, and monitoring, as well as the ability to encourage people

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aiming at making organizations more creative and consequently more competitive (Muzzio, 2019). As an empirical result, through creative leadership, the ability to restore and to leverage relational resources, such as trust, commitment, and resilience (Dovey, Burdon, & Simpson, 2017) is obtained by the successful combination of the reach of individual and collective goals.

Regarding the processes and dynamics that influence the creative process as a team, brainstorming emerges as a prevalent resource to identify the ways in which diversity and different types of conflict can affect the group (Kurtzberg & Amabile, 2001; Sawyer, 2007, 2017). The constituent stages of the creative process involve the generation, development, finalization or closing, and evaluation of an idea (Nemiro, 2002). In this process, leaders need to deal with conflicts, types of personality, interdependence of resources and rewards, temporal scarcity, and complex systems of cooperation (Kurtzberg & Amabile, 2001; Sawyer & DeZutter, 2009; Shalley & Perry-Smith, 2008). Conflicts, losses or inefficiencies can occur in teams; however, losses tend to be greater the larger the groups are (Bissola & Imperatori, 2011; Hargadon & Bechky, 2006), amplifying the challenges inherent to these creative processes. One of these challenges is called "groupthink," characterized by the absence of manifest disagreement in groups, in the sense of challenging pre-established ideas and decisions (Kurtzberg & Amabile, 2001).

Social interaction process

For many studies, creativity is a systemic process in which social interaction is fundamental (Csikszentmihalyi, 1997; Glaveanu et al., 2019). When thinking, in an interconnected way, how context explains the ideas produced via this conception, creativity is understood as a human process constituted in specific social contexts, therefore inseparable from the sociocultural context in which individuals are inserted (Choi et al., 2020; Momo & Martínez, 2017; Spadari & Nakano, 2015). This conception differs from others due to its interdisciplinarity and focus on social systems composed of groups of people in cultural contexts.

In the transition from the emphasis on individual action to the social dimension, the unit of analysis moves from cognitive processing and end-products to the logic behind collective practice (Bourdieu, 1990). Comparatively, focusing on individuals and disregarding the environment that surrounds them (Csikszentmihalyi, 1997) suggests the need for a change of focus, emphasizing that individuals are part of a social system of mutual influences and information. This systemic theory encompasses social, cultural, and personal factors to explain the process of sharing creativity.

Research that, until then, focused on personality traits of creative individuals started to relate creative learning to the construction of meaning, as it is formed by the interconnection of different individual practices, and, therefore, a cognitive and social activity (Amabile, 1996; Choi et al. al., 2020; Maitlis, Vogus, & Lawrence, 2013; Stierand, 2015). Thus, knowledge and the construction of meaning are interactive processes of learning in action between recognized norms, values, and practices on the one hand, and new knowledge and creative ideas on the

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other (Gherardi & Perrotta, 2013; Maitlis et al., 2013; Yanow, 2001). The synergistic work of people with divergent and complementary profiles, or interdisciplinary teams (Masi, 2003; Pinheiro, 2009; Tang, 2020) is indicated to collectively build the creative practice, potentially producing broader and richer results.

Discursive process

There is still little emphasis on the association between creativity and issues of discourse, power, and identity. Consequently, few studies are dedicated to understanding creativity as a discursively constructed phenomenon and process. The discursive dimension of organizational creativity examines elements such as subject positions and power relations produced in discourses about creativity. Emphasizing the ways in which discourse is practiced in creative production processes, discourse reveals how a construction of subjectivities can be staged in the formal and informal hierarchies of organizations (Tuori & Vilén, 2011). The focus is on the discursive practices of creativity and their effects on the subjectivities of the involved actors. These representations are significant to shape the ways in which people define themselves, are defined by others, attribute meaning to work, and position themselves in power relations and institutional status (Tuori & Vilén, 2011).

The discourse on creativity is constituted through discursive practices in which the object and certain subjects are identified and articulated in organizations (Prichard, 2002). Discourse is closely linked to power relations, thus, individuals are constructed in power relations governed by discourses (Tuori & Vilén, 2011). Adopting a discursive approach to creativity allows scholar to explore how the process of paving power relations and hierarchies goes beyond formal organizational structures. This approach helps to illuminate negative and political aspects of creative processes and uncover the existence of "hidden" hierarchies (Tuori & Vilén, 2011).

CRIATIVITY AS PRACTICE: A PERSPECTIVE OF RENEWAL FOR MANAGEMENT RESEARCH

The perspective of practice enables us to go beyond the traditional understanding of creativity as a purely mental action. Practice can expand the understanding of creativity by articulating the multiple aspects (e.g., human, material, aesthetic, emotional, and ethical) involved in the daily lives of people and organizations (Bispo, 2015; Gherardi, 2019; Raelin, 2007). Methodologically, practice-based research presupposes a thorough engagement with practice as it happens (zooming in). However, it is also necessary to move to a broader focus (zooming out) and seek the links of a particular practice in relation to other practices (Nicolini, 2012). By establishing the connections of the here-now practice with other practices, which persist in time and space and form a texture of dependencies and references, it is possible to expand our ability to understand organizational

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dynamics in what is perennial, creative, and transitory (Gherardi, 2019; Pimentel & Nogueira, 2018; Santos & Alcadipani, 2015).

The articulation of PBS with research on creativity helps us to open new paths and integrate contemporary conceptions of creativity. Thus, the invitation is to focus on the experienced practice of creativity, aiming at greater dialogue and mobilization between elements—human or not, such as knowledge, materialities, and discourses (Gherardi, 2016, 2019; Raelin, 2007). Despite being relatively recent, the contribution of PBS to OS is significant, as it focuses on practice as a system of activities in which knowledge is associated with practices and considers the social aspects of learning instead of purely cognitive action (Bishop, 2015; Gherardi, 2019; Nicolini, 2012; Raelin, 2007).

Epistemologically, PBS enable the adoption of social practices as a reference to better understand how organizations are formed, their intrinsic relationships, and their underlying organizational phenomena. It is a post-humanist perspective, which implies emphasizing the sociomaterial aspects that involve a practice and are collectively organized (Bispo, 2015; Bouty & Drucker-Goudart, 2018; Gherardi, 2019; Pimentel & Nogueira, 2018). So, how to conceive creativity as a practice? To stimulate future research, we propose to link PBS to studies on organizational creativity from four perspectives: (a) creativity as activity and achievement; (b) creativity as a routinely performed corporeity; (c) creativity as speech practice; and (d) creativity as a collective action based on knowledge. In PBS, Gherardi (2019) proposes the foundation of these strands. These aspects are not intended to circumscribe or limit the complexity of issues or the plurality of possibilities PBS offer. They seek to offer researchers on organizational creativity an initial path which facilitates the process of conceptual integration and regeneration. These strands, then, can help to structure a first contact with theories of practice to provoke new research on organizational creativity. However, they do not intend to offer a single path to researchers, as each strand (or their combination) may, for example, become a rich path for future research.

Creativity as activity and achievement (situated action, knowledge in practice)

The contemporary conception of creativity as a sharing process supports the strand of creativity as activity and achievement. In this aspect, the "know-how," in a situated activity, in relation to the accomplishment of something demands the shared mobilization of its agents, external means of action, and communication (Gherardi, 2019; Glaveanu, 2014; Mainemelis, 2016; Schatzki, 2001). The creative process develops itself in practice in a progressive, collaborative, and non-linear way.

Legitimation at the end of the creative process involves the construction of ideas, (re) placing them in the macro-scenario and considering the identity of the main social actors to then mobilize other people in different degrees of co-creation, unifying collectively enhanced imaginations (Coldevin et al., 2019). The practice of creating new ideas, activities, or projects

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requires a procedural and collective reinvention, as practice requires continuity between learning, making mistakes, testing, knowing, knowing how to do, and employing.

As creativity plays a vital role in attributing meaning to human existence (Csikszentmihalyi, 1997; Masi, 2003), its realization articulates creation with concretization. Associated with the process of creating unusual ways to deal with the same situations, creative practice implies combining different elements (human, sociomaterial, tacit, and observable) to arrive at a different solution or final result. The concept of developing creative processes (Masi, 2003; Spadari & Nakano, 2015) is associated with the concept of organizational practice (Gherardi, 2019), as both constitute a way of ordering the flow of situated relationships, knowledge, and actions. The principle of ordering creative processes is unstable and non-linear. Like practice, creativity occurs within a flow of construction, with constant openness to new creations and recreations of existing practices (Amabile, 2007; Coutu, 2008; Gherardi, 2019; Jones, 1993). This flow is favored by maintaining an environment of attention and stimulation in relation to tacit, aesthetic, sensitive, and emotional issues. This is illustrated by *haute cuisine* chefs, in how, in their creative processes, they transform aesthetic stimuli into a creative identity of their own through their sensitivity and aesthetic knowledge, thus attributing meaning to these stimuli (Stierand, Mainemelis, & Dorfler, 2019).

Creativity as embodiment routinely acted (performance)

Contemporary conceptions of shared creativity and social interaction underlie the aspect of creativity as a routinely performed corporeality. Although these conceptions do not explicitly deal with issues of the body, they indicate that creative activity occurs in a relational, collective, and interactional way between groups. Moreover, the social, material, and temporal dimensions of creativity are also considered, as well as the interconnection of cognitive, cultural, and social processes (Bureau & Komporozos-Athanasiou, 2016; Mainemelis et al., 2015). "Doings" and "sayings" incorporated into practices correspond to routine actions, including bodily ones. The body in PBS composes a collective that must be analyzed in the context in which individuals are inserted (Gherardi, 2019; Nicolini, 2012; Schatzki, 2001), although we have found no research that correlates it with the contemporary concepts of creativity. Acting creatively requires adequate time, initiative, a sense of opportunity, improvisation, flexibility, nonconformity, extroversion, persistence, self-confidence, autonomy, and attraction to challenges and complexities (Amabile 1999, 2017; Pinheiro, 2009). Therefore, acting creatively in practice requires the bodily mobilization and expression of this repertoire together with other material elements present in organizational realities, such as microphones, amplifiers, furniture, and living spaces.

The proposals by Bouty and Drucker-Goudart (2018) are enlightening and illustrative when they investigate managerial performance in relation to coordination in a racing sailboat. In addition to the commander's speech and daily actions, the coordination and combination of these mechanisms with the rhythm, the way of handling objects such as the helm and oar,

and the captain's temporal involvement in the continuous flow of activities were perceived as essential elements for collective team actions. To creatively act in a managerial way is, therefore, to corporeally act in practice.

Creativity as speech practice (institutional discourses and histories)

The contemporary conception of creativity as a discursive process supports the interpretation of creativity as a practice of speech. Since talking about creativity in its discursive conception is a practice in which the object and certain subjects are identified and articulated in organizations (Prichard, 2002), speech in an organizational context refers to an observable phenomenon, i.e., the adequate use of technical vocabulary. However, there are narrative elements of special importance that are not verbally expressed or even encouraged to be expressed. Such elements hold the potential for building subjectivities and establishing formal and informal hierarchies in organizations (Tuori & Vilén, 2011), such as sharing information in informal conversations, hesitation, voice intonation (when manifested), and even silence regarding the expression of ideas considered to be absurd – ideas that die before manifesting themselves. The psychological function of self-preservation leads to silence when one is unsure of the placement or adequacy of a response or new idea. Indeed, creative practice requires resolving the fear of making mistakes and exposing oneself so as to make it possible to share and mature the network of actors and emerging ideas, connecting creative inspirations in a shared way.

PBS promote narrative methods that focus on different realities, such as storytelling or life stories in people's daily lives (Gherardi, 2019; Nicolini, 2012). In practice, the development of the creative process requires everyday narratives, such as dialogues in informal spaces and their subjective and non-verbal elements, such as postures, intonations, feelings, and construction of meaning and emotions (Gherardi, 2019; Nicolini, 2012; Ochs & Capps, 2001). Expressing the creation of new ideas and practices reverberates the meaning attributed by the individual in a given context, forming a mesh of multiple interconnected creative actions, which Schatzki (2001) calls practical intelligibility. This, when verbalized, goes from an individual sense to the collective construction of creativity.

Creativity as collective practice based on knowledge

This aspect of creativity as a practice is not linked to any contemporary conception of creativity as a process. It is an aspect in which practicing and proposing any activity requires individual and collective work. Learning how to do it is a previous step (Gherardi, 2019; Raelin, 2007). So, acting creatively requires a continuum between acquisition of knowledge, creative proposition, and subsequent practice as a way of testing, refuting or realizing. In other words, an uninterrupted cycle. Although still related to an individual gift or talent, creativity is related to the ability of having a repertoire and mobilizing it to find innovative ideas or solutions—like connecting dots. It is the exercise of connecting these dots in a way that is yet unused which mobilizes

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repertoire and the ability to make such connections. For this, the acquisition of knowledge and expansion of this repertoire is essential, because the more numerous the points, the greater the possible connections.

As individual repertoires differ greatly in terms of experiences and backgrounds, the formation of creative teams benefits from a diverse composition of professionals from different areas, backgrounds, and psychological traits (Masi, 2003; Pinheiro, 2009; Sawyer, 2017; Tang, 2020). Moreover, tacit knowledge contemplates important points of reflection, such as emotion, and aesthetic simplicity and harmony. These reflection points act as sources to animate a creative idea (Stierand et al., 2019).

The phenomenon of formative practice claims that performance occurs during the creation of new ways of doing, combining elements such as sensitive knowledge, sharing ideas, materialities, and repetition before and after realization (Gherardi & Perrotta, 2013). The acquisition of knowledge in practice has the fundamental role of composing the previous repertoire, since learning, knowledge, and experience are antecedents of creative achievement by connecting information, skills or previous experiences (Kurtzberg & Amabile, 2001). The construction of knowledge and the accumulation of personal and professional experiences—successful or not—are carried out by social actors in situations and interactions that can either occur face-to-face or be mediated by information and communication technologies, formally or informally, individually or collectively, whether the individual immediately or later becomes aware of the acquisition, and the ability to transfer or to apply that knowledge. Considering that the expression of creativity permeates each of these situated processes, the acquisition and processing of applied knowledge occurs permanently in a procedural and continuous way, in parallel and complementarily to the creative practice undertaken in the dynamics between the collective and the individual.

DISCUSSION AND CONCLUSIONS

The multiple conceptions of creativity as a process can be thought of as contribution vectors to integrate the construction of a renewed conception of organizational creativity as practice. Understanding these conceptions and the perspective of renewal creates possibilities for future research on organizational creativity, which we will address below as three challenges.

The first challenge is theoretical-epistemological. The mapping conducted in the first section of this study sought to systematize traditional conceptions, the fields of knowledge that originated and fostered research over time in management, and the categorization of contemporary theoretical perspectives. This mapping helps researchers to situate themselves on the current state of the field and to prospect its conceptual renewal. This review shows how research attaches itself to individual aspects of the creative process, the products resulting from innovations, and the environment (Alencar et al., 2010; Spadari & Nakano, 2015) to the detriment of social aspects that favor procedural logic, learning, and the understanding of

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creative practice in the field of OS (George, 2007; Mainemelis et al., 2015; Slavich & Svejenova, 2016). Although some conceptions dialogue with PBS (creativity as a process of engagement, sharing, and social interaction and discourse), future researchers are invited to consider with greater precision, reflection, and robustness the epistemological turn that practice theories provide. This epistemological aspect needs to be fully addressed in future research if the intention is to genuinely consolidate the approximation of PBS in relation to studies on organizational creativity.

The second challenge is methodological. Empirical research will enhance the understanding of organizational creativity as a practice. Empirical research imposes the challenge of the methodological approach to be mobilized. When adopting the perspective of practice in the study of creativity, researchers will need to expand their ability to describe, reflect, represent, and understand organizational practices and their social subtleties, such as power, agency, and learning. Qualitative approaches—especially those based on practice (Gherardi, 2019)—, help in this direction due to their prerogative to explore, induce, and interpret how creativity is practiced in different contexts and organizational dynamics.

The third challenge is educational. The conception of organizational creativity as a practice should not be included in management education concerns. The challenge is to think about the teaching of creativity from teaching pedagogies that truly allow the knowledge of creativity to develop based on a practical conception. Regarding the training of administrators working in a complex society, characterized by multiple challenges (Araújo & Davel, 2018; Bendassoli et al., 2009), creativity represents an essential skill, necessary for decision-making, problem solving, conflicts, innovation, and regeneration of organizational practices.

Altogether, the results of this study allow us to better understand research on organizational creativity and to glimpse perspectives for developing future research. Thus, we hope to have contributed so that researchers and managers can better face the challenge of rethinking and regenerating organizational and educational environments that activate the full potential creativity emanates in practice.

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AUHTOR'S CONTRIBUTION

Pérola Cavalcante Dourado and Eduardo Paes Barreto Davel worked on the conceptualization and theoretical-methodological approach. The theoretical review was conducted by Pérola Cavalcante Dourado. Data collection was coordinated by Pérola Cavalcante Dourado and Eduardo Paes Barreto Davel. Data analysis included Pérola Cavalcante Dourado and Eduardo Paes Barreto Davel. Pérola Cavalcante Dourado and Eduardo Paes Barreto Davel worked together in the writing and final revision of the manuscript.

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ARTICLES

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ENVIRONMENTAL DISCLOSURE LEVEL: A FIRMS' PROACTIVE OR DEFENSIVE POSTURE?

Nível de disclosure ambiental: Postura proativa ou defensiva das empresas?

Nivel de divulgación ambiental: ¿Una postura proactiva o defensiva de las empresas?

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ABSTRACT

This paper investigated which theory best explains companies' motivation for environmental disclosure: the image theory (proxy: adherence to the Corporate Sustainability Index - ISE), or the legitimacy theory (proxy: materiality of provisions for environmental damage in the Balance Sheet - MatPA). Listed non-financial Brazilian companies with Environmental Disclosure Score (EDS) available on Bloomberg for the period 2010-2018 were analyzed. The panel data analysis indicated that among non-potentially polluting companies, ISE is significant to explain environmental disclosure and MatPA is not; among potentially polluting firms, MatPA is significant, but ISE is not. This suggests the coexistence of two antagonistic motivations for disclosure: the proactive strategy of creating value and differentiation through environmental disclosure prevails (image theory) in non-potentially polluting companies, whereas potentially polluters primarily adopt a reactive attitude toward disclosure, seeking self-legitimation with stakeholders after causing damage to the environment (legitimacy theory).

Keywords: recovery satisfaction, service failure, item response theory, PLS-SEM, attribution theory.

RESUMO

Este trabalho investiga qual teoria melhor explica a motivação das empresas para o disclosure ambiental: a teoria da imagem (proxy: adesão ao Índice de Sustentabilidade Empresarial – ISE) ou a teoria da legitimação (proxy: materialidade de provisões para danos ambientais no balanço – MatPA). São analisadas as empresas brasileiras não financeiras com Environmental Disclosure Score (EDS) disponível na Bloomberg no período 2010-2018. A análise de dados em painel indica que, entre empresas não potencialmente poluidoras, ISE é significativo para explicar o disclosure ambiental e MatPA não; já nas potencialmente poluidoras, MatPA é significativa, mas ISE não. Isso sugere a coexistência de duas motivações antagônicas para divulgar: entre empresas não potencialmente poluidoras prevalece a estratégia proativa de criar valor e diferenciação mediante disclosure ambiental (teoria da imagem); já nas potencialmente poluidoras, prevalece uma postura reativa de divulgar visando autolegitimação diante dos stakeholders, após danos provocados ao ambiente (teoria da legitimação).

Palavras-chave: *recuperação da satisfação, falha de serviço, teoria de resposta ao item, PLS-SEM, teoria da atribuição.*

RESUMEN

Este artículo investiga qué teoría explica mejor la motivación de las empresas para la divulgación ambiental: la teoría de la imagen (proxy: adhesión al Índice de Sostenibilidad Empresarial - ISE), o la teoría de la legitimidad (proxy: materialidad de las provisiones por daños ambientales en el balance - MatPA). Se analizan las empresas brasileñas no financieras con Environmental Disclosure Score (EDS) disponible en Bloomberg del período 2010-2018. El análisis de datos de panel indica que entre empresas no potencialmente contaminantes, el ISE es significativo para explicar la divulgación ambiental y la MatPA no; y en las potencialmente contaminantes, la MatPA es significativa, pero el ISE no. Esto sugiere la coexistencia de dos motivaciones antagónicas para la divulgación: entre empresas no potencialmente contaminantes prevalece la estrategia proactiva de creación de valor y diferenciación mediante la divulgación ambiental (teoría de la imagen); por otro lado, entre las potencialmente contaminantes, prevalece una postura reactiva de divulgación, con miras a la autolegitimación ante los stakeholders después del daño al medio ambiente (teoría de la legitimación).

Palabras clave: *recuperación de la satisfacción, falla del servicio, teoría de respuesta al ítem, PLS-SEM, teoría de la atribución.*

INTRODUCTION

In recent decades, Corporate Social Responsibility (CSR) reporting has been developed as a differentiation strategy through good environmental, social, and governance practices (Bebbington, Larinagga, & Moneva, 2008; Cormier & Magnan, 2015; Hooghiemstra, 2000; McBrayer, 2018, Minutolo, Kristjanpoller, & Stakeley, 2019; among others). This strategy is encouraged by benchmark sustainability indexes such as the Dow Jones Sustainability World Index (DJSI World) in the United States, FTSE4Good Index Series in the UK, Socially Responsible Investment (SRI) in South Africa, and Corporate Sustainability Index (ISE) in Brazil. It is also stimulated by disclosure guidelines, such as the Global Reporting Initiative (GRI), the United Nations (UN) Global Compact, the AA 1000, the ISO 14000, the Integrated Report of the International Integrated Reporting Council (IIRC), and the combination of the IIRC with the American Sustainability Accounting Standards Board (SASB) in 2020, and the sustainability council of the International Accounting Standard Board (IASB).

A foundation of this CSR reporting strategy is the image theory (Bebbington et al., 2008; Hooghiemstra, 2000), through which companies proactively seek to create value through the disclosure of good sustainable practices. This theory contrasts with the earlier legitimacy theory (Gray, Kouhy, & Lavers, 1995), whereby companies do not proactively disclose environmental information to create value but as a reaction to the negative impacts of bad practices or environmental disasters they were involved in, such as the case of Exxon Valdez (Deegan, Rankin, & Voght, 2000; Walden & Schwartz, 1998).

The debate about the theories that best explain the organizations' behavior toward environmental disclosure gains strength in a context of simultaneous growing demand for such disclosure of good practices and the occurrence of noisy socio-environmental disasters (such as those of the Samarco and Vale companies in Brazil). The theories under analysis are the proactive strategy to create socio-environmental value and differentiation (such as joining the ISE) and the theory seeking self-legitimacy in response to adverse environmental events (such as the existence of provisions for environmental damage on the balance sheet). More specifically, the research explores the explanatory power of these theories on the motivation of potentially polluting and non-polluting companies to engage in environmental disclosure.

In this study, companies' levels of environmental disclosure are measured by the Environmental Disclosure Score (EDS), the "E" component of the Environmental, Social, and Governance (ESG) disclosure score of the Bloomberg database. The proxy for the proactive attitude of companies that adopt environmental disclosure as a strategy to create value (image theory) is to be included in the ISE – a benchmark sustainability index of the Brazilian stock exchange B3 forming a theoretical portfolio of companies with sustainable practices. The existence of a provision for environmental damage recognized in the balance sheet is used as a proxy for an adverse environmental event that would lead to greater environmental disclosure (legitimacy theory).

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The sample is formed of all listed non-financial Brazilian companies with EDS available on the Bloomberg database in at least two years within the period from 2010 to 2018, which were classified as belonging or not belonging to environmentally sensitive (or potentially polluting) sectors: oil and gas, chemical, mining, metallurgy, forest products, and utilities, following Clarkson, Li, Richardson, and Vasvari (2008), and Deegan and Gordon (1996), among other authors.

This work adds to Brazilian research that examined the ISE as an explanatory factor for the level of environmental disclosure (such as Coelho, Ott, Pires, & Alves, 2013; Rosa, Guesser, Hein, Pfitischer, & Lunkes, 2015; Rover, Tomazzia, Murcia, & Borba, 2012). It could be argued that since these studies found a positive association between ISE and environmental disclosure, the image theory is valid to explain disclosure levels. However, none of these studies confronted belonging to the ISE portfolio with the existence of environmental provisions in the balance sheet to test the prevalence of one of the two theories in explaining the level of environmental disclosure, nor did they test differences in behavior between companies in polluting versus non-polluting sectors.

The relevance of examining the environmental provision as a proxy for adverse environmental events – which, according to the legitimacy theory, lead to an increase in the disclosure level – lies in the fact that an environmental provision in the balance sheet represents obvious bad news, since it reports the damage's measured value, with an increase in liabilities and a decrease in profit, impacting various financial indicators. In addition, the environmental provision constitutes the only mandatory, directly identifiable accounting evidence of damage caused – which led Barth, McNichols, and Wilson (1997) to analyze it as an explanatory factor for the disclosure of environmental obligations determined by the North American environmental protection agency in 1980. Environmental provisions range from estimated expenses with voluntary or mandatory remediation of environmental damage generated by the company's normal activities to lawsuits for environmental infractions, from the smallest and most frequent to major environmental disasters.

There is international and Brazilian literature on explanatory factors, whether on ESG performance (Garcia, Mendes-da-Silva, & Orsato, 2017; Lourenço & Branco, 2013; Miralles-Quirós, Miralles-Quirós, & Gonçalves, 2018), or on the level of ESG disclosure as a whole (McBrayer, 2018). There are also studies focused only on the environmental dimension of disclosure, whether mandatory (Barth et al., 1997; Chen, Cho, & Patten, 2014; Leal, Costa, Oliveira, & Rebouças, 2018) or voluntary (Cormier & Magnan, 2015; Cormier, Magnan, & Velthoven, 2005; Kim, Ryou, & Yang, 2020). However, these studies do not address the question asked in this research.

Another differential of this study is the use of the Bloomberg EDS as a proxy for environmental disclosure, which facilitates replicating the study and mitigates possible researcher bias inherent to the construction of an ad hoc index. The EDS is comprehensive as it includes mandatory and voluntary, positive and negative information obtained from publicly available sources and questionnaires applied to companies, covering more than 10 thousand firms from several countries. The Bloomberg ESG index is used in international research, both integrally (Albitar, Hussainey, Kolade, & Gerged, 2020; McBrayer, 2018) and focused on its environmental dimension

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(Aragón-Correa, Marcus, & Hurtado-Torres, 2016; Bellamy, Dhanorkar, & Subramanian, 2020; Qiu, Shaukat, & Tharyan, 2016). However, this index has not yet been used in the Brazilian context, nor in international studies analyzing this particular research problem.

The research results indicate that being ranked in the ISE is significant in explaining the environmental disclosure level for companies from non-potentially polluting sectors. However, the materiality of environmental provisions (MatPA) is not significant. The opposite occurs among potentially polluting companies: contrary to other studies (Coelho et al., 2013; Rosa et al., 2015; Rover et al., 2012), ISE does not have statistical significance, but MatPA does.

These results contribute to the literature by confirming the coexistence of antagonistic theories to explain environmental disclosure but in different contexts: the image theory explains the motivation of non-potentially polluting companies (proxy: being ranked in the ISE), and the legitimacy theory, the motivation of potentially polluting companies (proxy: MatPA). They also contribute to the practice by enabling consumers, investors, regulators, and society to better interpret high environmental disclosure: is it a sign of good practices, attracting recognition and investments, or is it self-legitimacy in the face of damage caused to the environment?

THEORETICAL FRAMEWORK AND HYPOTHESES

Voluntary environmental disclosure is part of the general parameters of voluntary disclosure, studied by Dye (2001), Healy and Palepu (2001), and Verrecchia (2001), whereby companies weigh the benefits, costs, and risks of disclosure and non-disclosure. The negative price reaction (Dye, 2001) for not disclosing bad news can generalize, through overshooting, the loss of reputation of all agents (Akerlof, 1970) – which is an opportunity for good agents to differentiate by being transparent.

As mentioned, new demands from society have been encouraging the companies' voluntary disclosure of non-financial information (characterizing CSR or ESG reporting), which includes disclosure of environment, ethics, governance, human rights, labor, gender, anti-corruption, and other information (Aguinis & Glavas, 2012; Gray et al., 1995). In this context, the literature on determinants of environmental disclosure presents two opposing theoretical approaches in the broader context of CSR reporting: the legitimacy theory (Gray et al., 1995) and the image theory (Bebbington et al., 2008; Hooghiemstra, 2000).

According to Gray et al. (1995, p. 54), the legitimacy theory (defined by Lindblom, 1994) underlies the attitude of a company that seeks to align its value system with the community's value system, obtaining legitimacy (particularly when there is a rupture of this congruence due to socio-environmental issues). The authors identify four strategies that companies can adopt to regain legitimacy: 1) recognize that the disruption originated from their own failures and report on real changes in the organization; 2) try to change the public's negative perceptions (considered by the company as misperceptions), but without changing its own behavior; 3) manipulate the public's perception, diverting attention, including through emotional symbols –

for example, instead of correcting a polluting industrial process, creating a social initiative; and 4) change the public's expectations of the company, considering them to be incorrect.

In close connection with the legitimacy theory, the stakeholder theory emphasizes that the continuation of a corporation requires the support of its stakeholders and that CSR reporting depends on a constant dialogue with these stakeholders (Gray et al., 1995, p. 53). Considering the overlaps between these theories, they will be considered together in this article.

Thus, the legitimacy/stakeholders theory assumes the company's reactive and defensive attitude by considering environmental disclosure as the base of a reaction to problems faced – it is a countermeasure in the face of adverse events to its legitimacy vis-à-vis stakeholders. This is the underlying view in studies testing hypotheses that companies involved in major incidents – or operate in environmentally sensitive sectors – have a higher level of environmental disclosure (Chen et al., 2014; Clarkson et al., 2008; Deegan et al., 2000; Walden & Schwartz, 1998; among others).

The image or reputation theory – exposed by Hooghiemstra (2000) and addressed by Bebbington et al. (2008) as "reputation risk management" – focuses on CSR reporting in the broader scope of communication, such as presenting the company's identity, promoting its image and reputation. This is a more proactive view of CSR reporting, which aims to interact with society, disclosing common values of the company and members of the public as "communication partners," whose perceptions and expectations can even change the company's identity (Bebbington et al., 2008, p. 59).

Thus, a more positive attitude is emphasized here, adopting a proactive strategy of seeking to create value through disclosure, as assumed by studies that relate disclosure to financial performance, image gains, and inclusion in benchmark stock portfolios (Bellamy et al., 2020; Cormier & Magnan, 2015; Minutolo et al., 2019; Qiu et al., 2016; Rosa et al., 2015; among others).

It is worth noting that both theories were developed in the context of major environmental disasters. For example, Hooghiemstra (2000) analyzes the transformation of Shell's CSR language, starting with the legitimacy approach in the face of accidents and moving on to a proactive and creative communication focused on public values.

Based on recent literature, this study tests the predominance of image theory to explain companies' environmental disclosure, testing hypothesis 1:

> H1: The proactive image theory (proxy: ranked in the ISE) explains the level of environmental disclosure in both environmentally sensitive and non-sensitive companies.

On the other hand, as potentially polluting companies are more likely to generate environmental damage, Hypothesis 2 is:

> H2: The defensive legitimacy theory (proxy: MatPA) explains the level of environmental disclosure in potentially polluting companies better than the proactive image theory.

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DATA AND METHOD

The sample comprises listed non-financial Brazilian companies with Environmental Disclosure Score (EDS) available on the Bloomberg Database in at least two of the years analyzed, from 2010 to 2018, totaling 107 companies, and featuring an unbalanced panel with 839 observations. The period begins in 2010, the first year of full adoption of the International Financial Reporting Standards (IFRSs) to ensure regulatory homogeneity in the treatment of provisions, and ends in 2018, the last year with EDS available at the time of collection (December 2020).

The EDS is a proxy for the dependent variable, environmental disclosure. It is one of the components of the Bloomberg ESG index and measures the degree of disclosure of information on environmental management on a scale from 0.1 to 100. It covers more than 120 industry-standardized environmental disclosure indicators, includes data from more than 10,000 companies, and is used by more than 320,000 subscribers globally. Data is collected using specific questionnaires from multiple sources, such as CSR reports, financial statements, carbon and waste generation information, water consumption, energy consumption, and others (Bellamy et al., 2020). Bloomberg's ESG index measures the level of disclosure, i.e., the amount of information provided by companies in these categories, and not the ESG performance of companies, as with other indices.

The main variables of interest are: (i) inclusion in the Brazilian stock exchange B3 benchmark sustainability index (ISE), and (ii) materiality of the amount of environmental provisions (MatPA).

ISE is a dummy that assumes value "1" for a company *i* that was listed in the ISE theoretical portfolio in year *t* and "0" otherwise. This index reflects the average performance of companies' share prices, selected mainly from a questionnaire that measures their commitment to corporate sustainability. The questionnaire comprises hundreds of questions organized in the dimensions of company operation, sustainability, and corporate governance.

MatPA is a quantitative variable that expresses the materiality of environmental provisions (MatPA) in relation to the total assets of a company *i* in year *t*. PA represents the environmental obligation recognized in the balance sheet of a company *i* in year *t*. According to the international accounting standard IAS 37 (IASB, 2001) (and its Brazilian counterpart, CPC 25), a company has to recognize a provision (immediately record a loss in income and a corresponding liability in the balance sheet) at the time of a damaging event that will lead to probable and measurable – with reasonable precision – disbursement. This record is clearly distinguished from the mere mandatory disclosure of damaging events in Notes where the disbursement of resources is only possible or difficult to measure (contingent liability). This study focuses on the effect of an environmental provision recognized in accounting because increasing liabilities and decreasing the company's results affect several financial indicators. It does not include contingent liabilities, as they do not impact the indicators and are only disclosed in the Notes.

The amount of PA was manually collected from the Notes of the companies' Standardized Financial Statements (SFSs). This procedure was necessary because, although the Brazilian Securities and Exchange Commission (CVM) chart of accounts allows companies to open balance sheet provisions by category (via specific sub-accounts), companies often disclose the total provisions on the balance sheet leaving the categories blank. However, they break down the total amount of provisions by category (e.g., tax, labor, environmental) in a table included in the Notes. In the collection process, companies that registered environmental provisions without detailing the specific amounts (combining them with other amounts in mixed categories such as "civil and environmental provisions") were considered companies without environmental provisions.

Considering that some sectors are more vulnerable to environmental damage and, therefore, have more environmental provisions, the variable *EnvSens* was inserted, with a value of "1" for companies belonging to environmentally sensitive sectors and "0", otherwise, following Clarkson et al. (2008) and Deegan and Gordon (1996): Oil, Gas & Consumable Fuels; Chemical; Metals & Mining; Paper & Forest Products; Independent Power and Renewables; Electric Utilities; Gas Utilities; and Water Utilities, according to the Industry level of the Global Industry Classification Standard (GICS) obtained from Bloomberg.

Exhibit 1 lists the variables of this study and the related literature. In addition to the variables of interest, other variables the literature considers as relevant to explain the level of environmental disclosure were adopted as control variables: size (net revenue), profitability (net margin), and indebtedness (interest-bearing liabilities/asset ratio). The variables expressed in thousands of Brazilian Reais (BRL) were corrected for inflation due to the long period under analysis, and the variable 'size' was transformed into a natural logarithm to reduce bias effects. Control variables were winsorized at 1%.

By using the entire population of non-financial Brazilian companies with EDS available on Bloomberg, the sample is not random and may not guarantee the representativeness of economic sectors. Considering the 'sector' level (more aggregated than the 'industry' level) of the GICS classification, which groups companies into ten sectors, the sample is distributed as follows: 31 companies from the 'utilities' (of which 22 are electricity), 17 from 'consumer discretionary,' 15 'industrials,' 13 'materials,' 11 'consumer staples,' and 20 distributed across the other five sectors. Due to such diversity, we chose to create the variable EnvSens, following Miralles-Quirós et al. (2018), instead of specific dummies for each sector, avoiding reducing the models' degrees of freedom.

The hypotheses were tested by organizing the analysis in two phases. First, a graphic and descriptive analysis was conducted, with difference tests between groups to identify whether the variables of interest differentiate levels of environmental disclosure in the sample. Second, regression analysis with panel data was carried out, combining characteristics of time series with a cross-section, allowing to observe the evolution of data over time comparatively and simultaneously. Statistical analyses were performed using SPSS and Stata software.

Exhibit 1. Variables used in the econometric models

Variables	Type	*Proxy*	Literature	Expected effect	Source of data
Level of environmental disclosure (EDS)	D	Environmental Disclosure Score – EDS	Aragón-Correa et al. (2016); Qiu et al. (2016); Bellamy et al. (2020)		*Bloomberg*
Corporate Sustainability Index (ISE)	I	Dummy assuming "1" for a company *i* included in the ISE index in year *t*; and "0" otherwise	Rover et al. (2012); Coelho et al. (2013); Lourenço e Branco (2013); Rosa et al. (2015); Leal et al. (2018)	(+)	B3
Presence of environmental provision (DmyPA)[(1)]	I	Dummy assuming "1" for a company *i* that presented environmental provision in year *t*; and "0" otherwise	-	(+)	SFSs
Materiality of environmental provision (MatPA)	I	Percentage of how much the total amount of the environmental provision (PA) of a company *i* in year *t* represents in relation to the total amount of the company *i*'s assets in year *t*	Barth et al. (1997)	(+)	SFSs
EnvSens	I	Dummy assuming "1" for a company *i* belonging to environmentally sensitive sectors; and "0" otherwise	Deegan e Gordon (1996); Clarkson et al. (2008)	(+)	*Bloomberg*
Size (Size)	C	Natural logarithm of the net revenue of company *i* in year *t*	Cormier et al. (2005); Leal et al. (2018); McBrayer (2018)	(+)	*Economática*
Profitability (Profit)	C	Net margin of company *i* in year *t*	Rover et al. (2012); Coelho et al. (2013)	(+)	*Economática*
Indebtedness (Ind)	C	Debt in relation to the total of debt plus equity of company *i* in year *t [D/(D+E)]*	Rover et al. (2012); Lourenço e Branco (2013)	(+)	*Economática*

Note: Variable D: Dependent; I: Interest; C: Control. (1)*DmyPA* is not used in regressions, it is used in graphs and average difference tests.

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Initial tests of heteroscedasticity were performed to identify the best panel model, (Breusch-Pagan/Cook-Weisberg test), multicollinearity (VIF test), first-order autocorrelation (Wooldridge test for panel data), and omitted variable test (Ramsey test). The tests indicated autocorrelation problems and omitted variables. The Breusch-Pagan, Chow, Hausman, and Hausman Robust tests were also applied using the variables of Equation 1 (without the lagged EDS variable), which indicated the fixed effects model as the best fit. After the definition of the fixed effects model, the robustness tests reinforced the presence of residual autocorrelation and heteroscedasticity (Wooldridge autocorrelation test and modified Wald test, respectively). The problem was confirmed with Fisher's test, which showed the stationarity of the dependent variable in all analyzed series.

The panel data model of the Arellano–Bover/Blundell–Bond System GMM methodology was used to mitigate the possible effects of regressors endogeneity. The model incorporated the lagged dependent variable and the explanatory variables, and the model adequacy was tested by Wald's Chi2 test. The Arellano-Bond AR (1) and AR (2) tests were used to verify first and second-order autocorrelation between the error and validity terms of the instruments, and the Sargan test, to check for overidentification of restrictions.

Equation (1) presents the model to be tested using panel data.

$$EDS_{i,t} = \beta_0 + \beta_1 EDS_{i,t-1} + \beta_2 ISE_{i,t} + \beta_3 MatPA_{i,t} + \beta_4 EnvSens_{i,t} + \beta_5 Size_{i,t} + \beta_6 Ind_{i,t} + \beta_7 Profit_{i,t} + \mu_{i,t} \quad (1)$$

The first hypothesis (H1) was tested using the model of Equation (1) for the full sample. For the second hypothesis (H2), the model was applied separately to the groups of environmentally sensitive companies versus the others, omitting the variable EnvSens. As the separate groups showed heteroscedasticity, the model with robust estimation was used.

The behavior of the variables of interest was tested in four other formats to assess the robustness of the findings using the following subsamples: (A) additionally balancing the panel, keeping only the companies that presented data in at least six of the nine years studied (exclusion of 17 companies); (B) maintaining the sample of A and replacing the insertion of the lagged dependent variable by the endogeneity control by considering autoregressive components (AR[1]) for the residuals; (C) shortening *t* to the most recent four years; and (D) covering only companies not included in the ISE. The tests were repeated for each subsample.

RESULTS

Descriptive analysis

Table 1 presents the descriptive characteristics of the quantitative variables (for the total sample and the sample subdivided between environmentally sensitive companies versus others), and Table 2 presents the dummy variables.

Table 1. Descriptive statistics of quantitative variables

Variable	Average	Standard deviation	Minimum	Median	Maximum
EDS	32.2190	18.2427	1.5504	31.0078	74.3802
MatPA	0.2752	1.1597	0.0000	0.0000	12.7255
SIZE	15.6113	1.4842	6.0472	15.5989	19.8797
IND	46.9665	31.0996	-39.5179	45.1603	364.7738
PROFIT	43.2178	1075.5070	-6123.1280	7.7274	26177.3800
Descriptive statistics for Subgroup with EnvSens=0					
EDS	30.2497	18.7996	1.5504	30.2083	71.3178
MatPA	0.0397	0.1594	0.0000	0.0000	1.6412
SIZE	15.4638	1.3795	11.7112	15.5989	19.0505
IND	47.7905	34.7033	0.1114	45.1603	350.3081
PROFIT	6.1536	35.0739	-408.1836	7.4987	166.2098
Descriptive statistics for Subgroup with EnvSens=1					
EDS	34.8139	17.1652	2.3256	31.7829	74.3802
MatPA	0.5855	1.7083	0.0000	0.0000	12.7255
SIZE	15.8056	1.5930	6.0472	15.6996	19.8797
IND	45.8808	25.5951	-39.5179	45.7543	364.7738
PROFIT	92.0565	1636.8540	-6123.1280	7.9047	26177.3800

Table 2. Analytical statistics of qualitative variables

	ISE		*DmyPA*		*Total*	Average *EDS*	Average *MatPA*
	0	1	0	1			
EnvSens = 0	362	99	406	55	*461*	31.1009	0.0424
EnvSens = 1	241	137	191	187	*378*	35.0183	0.6094
Total	603	236	597	242	839		
Average *EDS*	26.4365	46.9936	28.0142	42.5920			
Average *MatPA*	0.2452	0.3518	0.0000	0.8589			
Mann-Whitney	*p-value* = 0.0000		*p-value* = 0.0000			*p-value* = 0.0004	

Median equality test of *EDS* in the groups separated by *ISE*, *DmyPA*, and *EnvSens*

The discrepancy between the maximum and average values of MatPA in Table 1 results from the presence of the Brazilian state-owned oil company Petrobras, responsible for the

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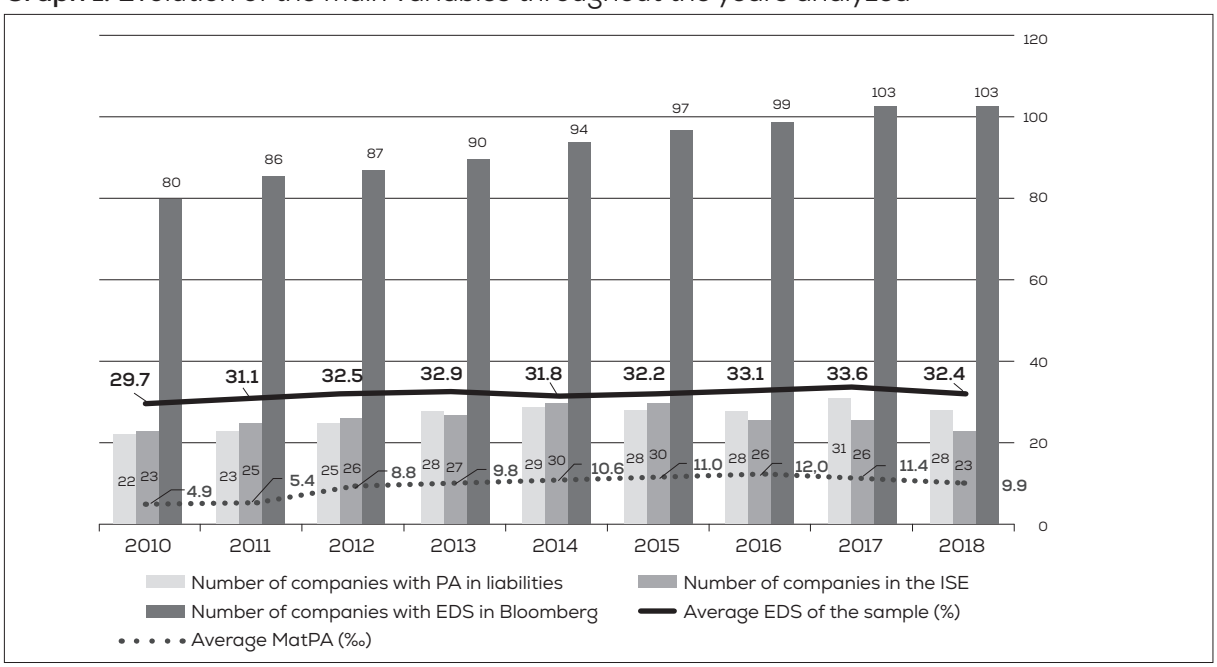
maximum values in all the years analyzed, which represent on average 66% of the total sum of environmental provisions in the sample. Although MatPA was between zero and 12.7% of total assets, its general average in the period was less than 1%. Also noteworthy was the discrepancy of the net margin in two observations of the company MMX, corrected with winsorization.

Table 2 shows that 29% of the observations had environmental provisions, 28% were included in the ISE index, and 43% were environmentally sensitive. It is worth adding that, among environmentally sensitive companies, 50% had PA, with an average value of BRL 2.2 billion, while among non-environmentally sensitive companies, only 12% had PA, and their average value was much lower, only BRL 130 million (values not included in Table 2). There was also a higher average EDS among companies that belong to the ISE versus the others, higher among companies that had PA versus the others, and higher among potentially polluting companies versus the others, suggesting the relevance of these variables to explain the EDS. Finally, both companies included and not included in the ISE had PA, but the MatPA average was higher among companies included in the Brazilian benchmark index.

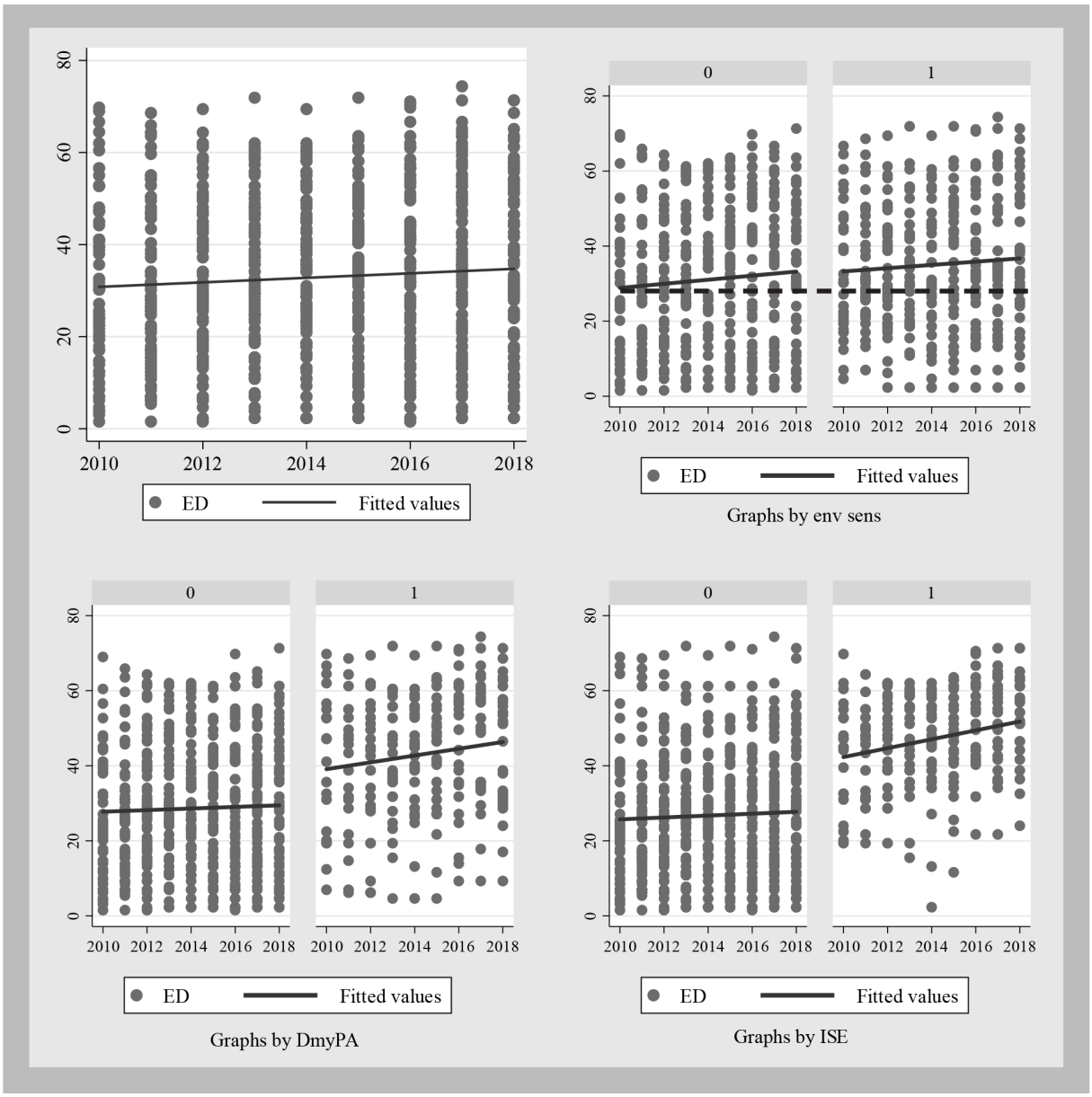
Graph 1 presents the historical evolution of the EDS and PA averages and the number of companies with EDS, ISE, and PA. The number of companies in this research (population with EDS available on Bloomberg) was increasing in the period, ranging from 80 to 103. However, the number of companies with PA or ISE was relatively stable (from 22 to 31 and from 23 to 30, respectively). The annual average of the EDS was relatively stable, varying between 29.7% and 33.6%, a level of environmental disclosure considered low (on a scale of 0.1 to 100). The annual average of the sum of the amounts of PA in the sample (not reported in the graph) fluctuated a lot, between BRL 17.7 billion and BRL 78.6 billion, with a growth trend over the years. The average annual materiality of PA (PA/Assets) ranged between 0.49% (or 4.9‰ in the graph) and 1.2%, with an increasing trend until 2016 and decreasing after that year.

Graph 1. Evolution of the main variables throughout the years analyzed



Graph 2 presents the behavior of the EDS variable over time in four panels formed from the dummy variables: observations without grouping; the observations grouped between those that had PA (1) and those that did not (0); grouped between environmentally sensitive companies (1) and not (0), and grouped between those included in the ISE (1) and those that were not included (0).

Graph 2. Evolution of the level of environmental disclosure (EDS). Companies separated into groups: for operating in environmentally sensitive sectors (1) or not (EnvSens); for presenting environmental provisions (PA) (1) or not (DmyPA); for inclusion in the ISE (1) or not (ISE) (Stata)



Obs.: The black dashed line in the graph where companies were grouped by EnvSens shows a line parallel to the X-axis to aid in the interpretation of the black line.

Graph 2 suggests that the variables of interest in this study impact the level of environmental disclosure. While the average level of disclosure of all the companies studied showed little growth over time, the level of disclosure of companies included in the ISE and companies that recognized some environmental provision is visibly different from the zero group, both due to the higher level of disclosure and the slope of the fit line, showing more significant growth over time. For the panel that separates companies that belong to environmentally sensitive sectors (EnvSens = 1) from the others, there was a slight upward trend in EDS over time in both groups. However, the level of disclosure in the environmentally sensitive group was always higher, suggesting that potentially polluting companies tend to have a higher level of environmental disclosure than the others.

From these graphs, statistical tests were performed to check the power of the variables of interest to differentiate the level of environmental disclosure, shown in Table 2. As the EDS and the other quantitative variables of the study did not present normal distribution, the Mann-Whitney test was used, with a null hypothesis that the groups have the same median. For the three dummies tested, ISE, DmyPA, and EnvSens, the median of EDS in group zero was statistically different from the median of EDS in group 1, suggesting that the variables of interest may have explanatory power in econometric models for predicting the dependent variable.

Table 3 presents the correlation indices for all pairs of variables used in the regression. The correlation calculation methodology depends on the type of variable: Pearson's correlation for pairs of scalar variables, the Phi coefficient for pairs of nominal variables, and the point-biserial correlation for pairs with a scalar and a nominal variable. The highest correlations with EDS were ISE and Size, suggesting that these variables will be significant in the econometric model. The absence of a high correlation between the explanatory variables is worth noting.

Table 3. Indices of correlation between the variables

	EDS	*MatPA*	*Size*	*Profit*	*Ind*	*ISE*	*EnvSens*
EDS	1						
MatPA	0.131***	1					
Tam	0.424***	0.068**	1				
Rent	0.147***	-0.016	0.057	1			
End	0.105***	-0.185***	0.215***	-0.298**	1		
ISE	0.507***	0.041	0.314***	0.043	0.064	1	
EnvSens	0.156***	0.229***	0.126***	0.01	0	-0.163***	1
	Point-biserial correlation			Pearson correlation		Phi coefficient	

Note: ***, **, and * indicate significance at the level of 1%, 5%, and 10%, respectively.

Regression analysis

To test the hypothesis that the ISE explains the level of environmental disclosure both in potentially polluting companies and in others (H1), and the hypothesis that the MatPA is more relevant to explain the level of environmental disclosure in potentially polluting companies than being included in the ISE index (H2), the dynamic panel model systemic GMM was used, in three regressions: (1) considering all observations, (2) taking only the non-polluting group, and (3) taking the polluting group. Table 4 presents the results.

Table 4. Results of data panel analyses

	Dynamic panel data Arellano-Bover/Blundell-Bond			
		GMM standard errors	Robust standard errors	
Var / Coef.	Expected effect	All companies	EnvSens = 0	EnvSens = 1
EDS lag1	+	0.7002 ***	0.8403 ***	0.4081 ***
ISE	+	2.6147 ***	3.4578 ***	-0.4263
MatPA	+	0.3375	-1.6137	0.9555 *
EnvSens	+	3.6325	omitted	omitted
Tam	+	2.1152 **	2.0277 **	0.2522
End	+	0.0486 **	-0.0719 ***	-0.0388
Rent	+	0.0011	-0.0016	0.0092
Constante		-26.2952 **	-21.7982 *	11.4518
Wald chi^2		168.4500 ***	170.5000 ***	30.0100 ***
Observações		726	410	316
P-v. Sargan test		0.2595	--	--
P-v. Abond AR (2)		--	0.5796	0.1053

Note: ***, **, and * indicate significance at the level of 1%, 5%, and 10%, respectively.

The three models showed significance at the 5% level, both for Wald's Chi2 and for the assumption tests (the model for potentially polluting companies showed a low but significant p-value in the test for the presence of autocorrelation).

In Column 1, which covers all observations, the Arellano-Bover/Blundell-Bond model showed significance at the 1% level for the variable EDS lagged by one year and for the

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variable ISE, while Size and Ind were significant at the level of 5%. MatPA, EnvSens, and Profit variables were not significant. About 70% of the environmental disclosure behavior of year *t* tended to be repeated in the following year (EDS lag1), confirming McBrayer's (2018) findings of persistence in ESG disclosure decisions. These results confirm H1, indicating the prevalence of the proactive image theory as an explanation of the level of environmental disclosure when considering companies as a whole, since the ISE variable was significant, while the MatPA and EnvSens variables were not.

From Column 2, which considers only non-polluting companies, the result was similar to the model with all companies, but the values of the ISE and lagged EDS coefficients were higher, showing even greater persistence in the behavior of environmental disclosure. The different results of the indebtedness variable are worth noting: it had a negative coefficient and greater significance, indicating that more indebted non-potentially polluting companies tend to present a lower level of disclosure.

Column 3, focused on potentially polluting companies, offers a notably different result. Only the lagged EDS and MatPA variables were significant. The coefficient of the lagged variable was much lower than in the other models: only about 40% of the EDS value at *t* was explained by the EDS at *t-1* (versus 84% in Column 2), suggesting that the level of disclosure among potentially polluting companies is not as persistent as among non-polluting ones. These results partially confirm H2: on the one hand, they indicate the validity of the reactive theory of legitimacy to explain the level of environmental disclosure among potentially polluting companies, since the MatPA variable was significant (at the level of 10%); but, on the other hand, they refute the validity of the proactive image theory in this context, since ISE had no significance.

However, the result of this model in Column 3 is less robust than the others (at the 11% significance level, the model violated one of its assumptions). Thus, to assess the robustness of these results, the variables of interest were tested using four more different models, as defined in the method section. The results of these tests are presented in Table 5 (focused on the variables of interest).

Table 5. Behavior of variables of interest in other estimation models

	t<6 was not included		Idem without lagged variable		t: 2015 to 2018 (balanced)		Only ISE=0
	Dynamic data panel		Panel GLS EA		Panel GLS EA - Driscoll-Kraay		Panel GLS EA
	EnvSens = 0	*EnvSens = 1*	*EnvSens = 0*	*EnvSens = 1*	*EnvSens = 0*	*EnvSens = 1*	*All*
Observ	384	302	438	342	216	160	548
ISE	3.3712 ***	-0.0483	5.057 ***	2.384 **	9.3723 ***	5.2721	*omitted*
MatPA	-1.7134	0.9795 **	-1.059	1.049 ***	-1.8134	0.8741 **	0.8648 ***
Wald chi2	184.13 ***	59.69 ***	65.39 ***	24.14 ***	1039.0 ***	11315.6 ***	70.12 ***

Note: ***, **, and * indicate significance at the level of 1%, 5%, and 10%, respectively.

The first test covers a more balanced set of observations after excluding companies without EDS in at least six of the nine years studied. The subsample of 90 companies showed similar results to the original model (Table 4): for non-potentially polluting companies, ISE was significant and MatPA was not, while for polluters ISE was not significant and MatPA was (now at the level of 5 %). Next, 18 companies were excluded from the subsample, leaving the panel fully balanced: 71 companies for nine periods (not shown in the table). The behavior of the variables of interest was maintained, improving the Abond AR(2) result to 0.1631, reinforcing the previous results.

The second test, still with the subsample of 90 companies, was performed without the inclusion of the lagged EDS variable, but with the inclusion of AR(1) error terms and used the random-effects model, as indicated by the Hausman test. The model showed significance, and the result changed very little. The MatPA variable remained significant only in the potentially polluting group (now at 1%), but ISE became significant in this group. However, ISE was less significant than MatPA among polluters, also confirming H2.

The third test used only the most recent four years in a balanced panel model with random effects and Driscoll-Kraay correction (indicated by the tests). The behavior of the variables of interest remained similar to that of Table 4 and Test 1. This test was performed to better contrast the findings of Coelho et al. (2013), Rosa et al. (2015), and Rover et al. (2012) who, by studying only potentially polluting companies, found the significance of the ISE (these studies covered shorter periods [up to three years] and from long ago [up to 2011 at most]).

Finally, to isolate the effect of simultaneously a) being included in the ISE (proactive strategy of creating value through differentiation in sustainable practices – image theory), and b) recognizing to have generated environmental damage by including PA in their balance sheet (reacting to adverse environmental events – legitimacy theory), the fourth test was carried out, covering only companies that were not included in the ISE. In other words, the objective was to analyze what motivates environmental disclosure in companies that do not adopt a proactive strategy of creating value through sustainable practices (not in the ISE). The panel model with random effects indicated by the statistical tests, especially the Hausman test, showed that MatPA was significant at the 1% level to explain the level of disclosure in these companies.

It is worth saying that the models presented in the study were run with and without sector and year control, but there was no significant difference.

Thus, both the base model and the robustness tests consistently indicated that adopting a proactive strategy to create value through differentiation in sustainable practices (image theory, being included in the ISE) explains the level of environmental disclosure among companies in non-polluting sectors. Among potentially polluting companies, the legitimacy theory prevails to explain the level of environmental disclosure since being included in the ISE was not significant, but MatPA was (ISE appeared in test 2, but MatPA was more significant). Thus, in potentially polluting companies, the motivation to increase environmental disclosure seems to be an attempt at self-legitimacy in reaction to damage caused to the environment.

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CONCLUSION

This research explored which of two opposing theories best explains the motivation of companies for environmental disclosure: the image theory, through which the company increases its environmental disclosure as a proactive strategy to create value differentiating socio-environmental practices (proxy: adherence to the ISE); or the legitimacy theory by which the company increases its environmental disclosure in search of self-legitimacy toward its stakeholders, reacting to damage caused to the environment (proxy: MatPA in its balance sheet). It also investigated how these theories explain the behavior of potentially polluting versus non-polluting companies.

A panel data analysis examined data from listed non-financial Brazilian companies with EDS on Bloomberg available from 2010 to 2018, observing their disclosure behavior regarding the environmental provisions (MatPA) and their inclusion in the ISE, separating between environmentally sensitive (or potentially polluting) and non-polluting companies.

The results indicated that for non-environmentally sensitive companies, being included in the ISE was significant to explain the level of environmental disclosure, whereas presenting environmental provision was not. However, the opposite occurs among environmentally sensitive companies, where the inclusion in the ISE did not have statistical significance, but the materiality of environmental provisions did. In both groups, the disclosure of a given year is significantly associated with the previous year.

These results contribute to the CSR or ESG reporting literature by confirming the coexistence of antagonistic theories to explain environmental disclosure, but in different contexts: non-potentially polluting companies tended to invest in disclosure as a strategy to create value and differentiate themselves (proxy: included in the ISE), corroborating the image theory, whereas potentially polluting companies tended to use environmental disclosure as a reaction to adverse environmental events (proxy: MatPA), in a defensive strategy of mitigating damage in search of self-legitimacy toward their stakeholders, confirming the legitimacy theory. Thus, both theories coexist, but each theory explains the motivation of a distinct group of companies: the image theory explains the motivation of non-environmentally sensitive companies, while the legitimacy theory explains the potentially polluting companies' motivation to disclose.

These results also contribute to the practice of CSR or ESG reporting by alerting investors and consumers that high environmental disclosure does not always indicate high environmental performance. On the contrary, it may indicate an attempt of self-legitimizing in the event of causing environmental damage. They also show that non-polluting companies interested in differentiation need to effectively incorporate their good environmental practices into their identity to ensure credibility and avoid being confused with those that only seek to regain legitimacy in the face of damages caused.

It is important to be cautious when interpreting these results, considering them as associations and not causality despite the robustness tests performed. Finally, studies seeking to extend the results obtained in this research must carefully consider the particularities of the sample analyzed, focused on the Brazilian market and on companies that are larger and more relevant to the market – criteria for an organization to be included in the ESG index available in the Bloomberg database.

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Maisa de Souza Ribeiro, Edilene Santana Santos e Mariana Simões Ferraz do Amaral Fregonesi worked on the conceptualization and theoretical-methodological approach. The theoretical review was conducted by Maisa de Souza Ribeiro, Edilene Santana Santos e Lucelma Maria dos Santos Cunha. Data collection was coordinated by Maisa de Souza Ribeiro e Lucelma Maria dos Santos Cunha. Data analysis included Mariana Simões Ferraz do Amaral Fregonesi, Edilene Santana Santos e Maisa de Souza Ribeiro. Maisa de Souza Ribeiro, Edilene Santana Santos, Mariana Simões Ferraz do Amaral Fregonesi and Lucelma Maria dos Santos Cunha worked together in the writing and final revision of the manuscript.

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BOOK REVIEW

Translated version

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WHAT MANAGEMENT TO POSTPONE THE FALLING SKY?

THE FALLING SKY: WORDS OF A YANOMAMI SHAMAN

Davi Kopenawa and Bruce Albert. Cambridge, MA, USA: Harvard University Press, 2013, 690 pp.

> *An Indian will descend from a brightly coloured star. From a star that will come at an astonishing speed and will land in the heart of the southern hemisphere, in America, in an instant. (Caetano Veloso)*

What can researchers in the field of socio-environmental management learn from an indigenous shaman? This question may prove rather pertinent if investigators in the field face up to the challenge of reading *A queda do céu: Palavras de um xamã Yanomami* (see The Falling Sky: Words of a Yanomami Shaman, in its English edition). This book, by French anthropologist, Bruce Albert, and the indigenous intellectual, Davi Kopenawa, and the fruit of a strong friendship born out of working closely together for more than 30 years, is an impressively substantial tome. As Eduardo Viveiros de Castro points out in its foreword, for the scientific anthropology community it constitutes an object as unprecedented as it is composite. It is unprecedented in the innovation it brings to the construction of anthropological knowledge, being the result of an ethnographic pact sealed between the authors, which demanded processes of translation and mediation, the complexity of which is pointed out by Albert in the prologue and detailed in the postscript: "How this book was written".

It is composite in that it blurs the boundaries between genres of anthropological descriptions. This is a unique biography of an indigenous survivor who, before returning to his village to become a shaman, lived for years in towns and cities in the Amazon region, working for supposed Indian protection agencies and/or as an interpreter on the expansion frontiers. It is also a description of the poetic-metaphysical foundations of a worldview whose wisdom is only now beginning to be recognized. Lastly, it is a powerful exercise in symmetrical anthropology, a rigorous and scathing analysis of the world of white people and their morbid relationship with the planet. Above all, it is because of this third aspect of the book that I recommend that researchers in the field of management studies should read it, especially those whose research interests lie in socio-environmental management.

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Anthropology, whose origin as a science dates back to the end of the 19th century, was originally constituted as the study of alterity. One of its classic authors, the North American Clifford Geertz, once said that its role was not to answer the deepest questions of Western society, but to make available the inventory of answers that other cultures have given to those same questions. To that end, ethnography, its method *par excellence*, was a means of accessing the point of view of the "other". What is new in this work is that it does not bring the Western anthropologist's interpretation of this "other", but an indigenous intellectual's interpretation of the West.

Divided into three parts, each of which consists of eight chapters, plus prologues written by each of the co-authors, the aforementioned postscript and various maps and appendices that help readers situate themselves in territorial, linguistic, historical, and sociological terms, the book delivers a lucid and unequivocal message. This message can be summarized as follows: if commodity people, that is, the whites and their "civilizational" machine that destroy not only nature, but also the forms of existence that represent alternatives to Western modernity do not listen to and take the words of the forest peoples seriously, the sky will fall. And, if this comes to pass, the consequences will affect both indigenous people and their tormentors.

The notion of the falling sky is found in the world destruction myths of several indigenous ethnic groups. Throughout human history different cultures have produced myths about the creation and destruction of the world, such as the flood narrative in Genesis for the Judeo-Christian civilization. Myths, anthropologists argue, are stories by which a society expresses itself, indicates its ways, and argues with itself. Although they may not bring a "truth", this does not mean that they have no value. It is their efficacy and not their veracity that should be the criterion for assessing them. What should be appreciated in them is their capacity for guiding human thought and action when dealing with important existential questions. Who among us would disagree with the usefulness of this myth of a falling sky at a time when the West, and perhaps even more so what its transplant to the 'sad tropics', is being shaken by so many different crises (epidemiological, economic, political, social, environmental, moral, spiritual)? Does the Covid-19 pandemic, resulting from the SARS-COV-2 virus that is plaguing us and dragging on, leave any room for doubt or disagreement?

Let the reader be not deceived, however! As I stated above, this is a heterogeneous piece of work. A life story and a counter-anthropology are added to the mythical narrative, and the subject whose life we have access to possesses the credentials that enable him to weave an analysis that is as shrewd as it is ironic with regard to the incivility of whites, who are blinded by the "metal smoke". These credentials are derived from the lessons learned from the innumerable acts of violence that have been perpetrated by successive necropolitical policies on the author, on the Yanomami society, and on indigenous peoples in general. They also come from the wisdom of a shaman who, in a demonstration of generosity, but also as a last warning, offers "us" the "beautiful words" which have been passed on to him by his ancestors.

It is by respecting these credentials that "we" can bow (getting ashamed?) before an image of "ourselves" that he exposes, with no complacency, by way of a set of mirrors: "White people

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don't think too far ahead into the future. They're always too preoccupied with the things of the moment. [...] They are ingenious, it's true, but they lack a lot of wisdom". Or, again, in phrases originally spoken in the interviews and conferences he has given around the world and that are arranged as epigraphs in some of the chapters: "What do white people do with all this gold? Do they eat it, by any chance?"; "They [New Yorkers] are like ants. They walk one way, turn suddenly, and continue on another. They always look at the ground and never at the sky"; "I think you [white people] should dream of the earth, for it has a heart and breathes".

Or yet again, in this excerpt: "White people ask for money for everything all the time, even to drink water and urinate! Wherever you go there's a crowd of people hurrying everywhere without knowing why. You walk quickly from one place to another in the midst of strangers, without stopping and without speaking,. The life of the whites who bustle about like this all day long like *xiri na* ants [a species of ant, according to Yanomami classification and nomenclature] seems sad. They're always impatient and fearful of not arriving on time for their jobs, or of being fired. They hardly sleep and run around sleepily all day. They only talk about work and the money they don't have. They live without joy and grow old quickly, always busy with empty thoughts, and always wanting to acquire new commodities. Then, when their hair turns white, they're gone, and work, which never dies, always survives all of them. Then their children and grandchildren go on doing the same thing".

This is straight talk, which we can no longer pretend surprises "us" by being exotic. We must see it as a message that, despite being obvious, has always been hidden, or perhaps it would be better to say concealed, silenced. Then, we can imagine and put into practice other ways of managing the common home we share, including with other species. If management studies are an eminently interdisciplinary area of knowledge, which throughout its history has sought inspiration in various sciences, including anthropology, it should benefit from the lessons anthropological science has learnt from being challenged by other kinds of knowledge, such as indigenous knowledge. This movement of renewal is urgent. Otherwise, "we" will only be left with the desperate hope that Davis Kopenawas, Ailtons Krenaks, and new generations of indigenous shamans keep on living. After all, as he also tells us: "Why do I keep on fighting? Because I'm alive! [...] As long as the shamans are still alive, they can prevent the sky from falling, even if it gets very sick".

AUTHOR CONTRIBUTIONS

Pedro Jaime worked on the conceptualization and theoretical-methodological approach, theoretical review, writing and final revision of the manuscript.

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