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ORGANIZATIONAL INNOVATIVENESS AND INNOVATIVE PERFORMANCE: A MULTIDIMENSIONAL MODEL

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SUMMARY

The objective of the study was to investigate Organizational Innovativeness (OI), or the organizational conditions that enable companies to innovate. A multidimensional model was developed to identify OI dimensions. The model's capacity to evaluate the impact of such dimensions on innovative performance was empirically tested with a sample of 200 medium and large-scale companies from manufacturing and services sectors in Brazil. The data collection instrument comprised 54 questions related to the ten dimensions of OI and 9 questions related to innovation performance. The data were analyzed using canonical correlation analysis. The model displayed an ability to explain 95.3% of the variation in innovative performance in connection with innovation in products and services, and 92.8% regarding organizational improvements. The findings point to a decisive role of the proposed OI dimensions in relation to innovative performance. The canonical functions indicate an explanatory power of 96.38% for “Learning”, 69.39% for “People”, 66.90% for “Networking”, 65.76% for “Culture”, 63.27% for “Leadership”, 62.95% for “Processes”, 54.16% for “Organizational Structure”, 54.06% for “Strategy”, 49.65% for “Mensuration” and 40.36% for “Technological Infrastructure”. Therefore, organizational learning has a key role for the achievement of innovation results in the companies surveyed. Other dimensions also appear as important elements of OI, most notably human resource policies, organizational culture and leadership, as well as the ability of the firm to exploit is external relationships and processes to leverage its knowledge assets for innovation.

Key words: Organizational Innovativeness, Innovation, Innovative Performance.

1. INTRODUCTION

Innovation studies have gained prominence as companies, motivated by increasing competition, shift from dominant forms of bureaucracy and work specialization to flexible and lean organizational structures (Suriyamurthi et al, 2013). It can be argued that innovation arises from the mobilization of a set of resources, behaviors, and activities, thus it reflects the convergence of various complex and dynamic factors in a specific organizational context. In this sense, the success of strategies and policies on stimulating innovation depends greatly on the understanding of factors that sustain the capacity to innovate in dynamic environments.

Many studies have sought to identify and measure the inputs of the innovation process, such as the Oslo Manual, the Community Innovation Surveys and national surveys (Alcaide-Marzal & Tortajada-Esparza, 2007). Others have identified elements such as financial investments (Reinstaller et al., 2010; Dotzel et al., 2013), patents and commercialization of innovative products and services (Remneland-Wikhamn & Wikhamn, 2011). However, innovation surveys tend to focus on measures of process inputs and outputs, rather than the process itself or the dynamics that create the innovation (Beyhan et al., 2009). It has been suggested that the use of input and output indicators of the innovation process is akin to Goodhart's Law, in which any statistical evidence related to a set of indicators tends to degrade as soon as rules are created to improve, not the process, but the indicators themselves (Freeman & Soete, 2009). Furthermore, macro-level indicators, such as the availability of skilled labor, capital, government regulations, and national culture do not appear as decisive drivers of radical innovation in companies (Tellis et al., 2009). In this sense, further studies are required for a full understanding of the factors that enable organizations to implement innovations in a successful way (Sawang & Unsworth, 2011).

Considering the shortcomings of input and output indicators of the innovation process to assess the elements that lead to innovation, such as insufficient attention to internal factors in specific contexts, this study set out to investigate the organizational conditions that enable companies to innovate — defined in this context as Organizational Innovativeness (OI). Therefore, the present study aimed to develop a theoretical model that identifies OI dimensions, and to verify empirically the model's capacity to evaluate the impact of such dimensions on innovative performance.

2. INNOVATION AND INNOVATIVENESS

The term "innovation" can be defined as the implementation of new, or significantly improved, products (goods or services) or processes or new methods of marketing, organizational practices, work organization, and establishment of external relations (OECD, 2005). While the term "innovation" is associated more frequently with results (Sawang & Unsworth, 2011; Autant-Bernard et al., 2010), the term "Organizational Innovativeness" has been employed in connection with the organizational conditions that enable the innovation to occur (Bornay-Barrachina et al., 2012; Cepeda-Carrion et al., 2012). According to Dotzel et al. 2013), it is the organizational capacity or propensity to introduce innovations. Rubera and Kirca (2012) define it as the receptivity to new ideas that lead to the development and release of new products. Brockman et al. (2012) emphasize the ability to break established procedures, and thus facilitate the generation of innovative ideas, experimentation, and creativity, which in turn would lead to the development of new products and technologies.

Despite the distinction between the two concepts, it is not uncommon to find studies that use the terms as synonymous, applying mixed measures for both innovation and innovativeness (Dotzel et al. 2013; Rubera & Kirca, 2012; Uzkurt et al., 2012; Brockman et al., 2012). In the present study, OI encompasses the organizational dimensions that support the efficient management of internal and external knowledge flows and the tangible and intangible assets that sustain the company's capability to innovate in a continuous and long-lasting manner (Quandt, Ferraresi & Bezerra, 2013).

3. A MULTIDIMENSIONAL MODEL OF ORGANIZATIONAL INNOVATIVENESS

This approach assumes that the success of the strategies and policies that encourage innovation depends on the understanding of factors that sustain the capacity of the organizations to innovate. In the proposed model, such factors may be understood as a set of resources, behaviors, and activities, dynamically mobilized for the continuous development of new products, processes, and systems (Quandt, 2009). Several models have been proposed to diagnose organizational knowledge management (Khatibian et al., 2010; Kuriakose et al., 2011) and innovativeness (Subramanian & Nilakanta, 1996; Garcia & Calantone, 2002; Hult et al., 2004; Wang & Ahmed, 2004; Prajogo & Ahmed, 2006; Smith et al., 2008; Crossan & Apaydin, 2010; Jaakson et al., 2010). The proposed model comprises ten dimensions, building on factors that are recurrently associated in the literature with organizational conditions that enable innovation.

1. Strategy: As a driver of innovation, it reflects the priorities of the organization in plans and specific actions (Oke et al., 2012). Strategic orientation from higher hierarchical levels, with a focus on innovation, is an essential factor (Prester & Bozac, 2012).

2. Leadership: The role of the organization's leaders is relevant, especially in the context of managerial innovation (Vacaro et al., 2012), as well as in innovation-oriented human resource practices (Suriyamurthi et al., 2013; Zhang et al., 2010).

3. Culture: Organizational performance is directly affected by the innovation culture (Brockman et al., 2012). Innovative structures and processes cannot be fully sustained without a supportive organizational culture (Martins & Terblanche, 2003; Rubera & Kirca, 2012; Tellis et al., 2009).

4. Organizational structure: The organizational structure is a vital element for the success of innovation, together with incentive systems (Prester & Bozac, 2012). Organizational innovations are closely related to process-oriented management and organizational structure (Uzkurt et al., 2012).

5. Processes: Process-oriented management tends to generate better innovation results than product-oriented management (Rubera & Kirca, 2012). In general, a systematic innovation process involves the development of business plans and the identification of opportunities in connection with technological developments (Sheu & Lee, 2011).

6. People: Companies are more innovative when they add more value their own employees (Mieres, et al., 2012). Coordination and management of individual talent is significantly related to innovative capacity and consequent competitiveness of organizations (Bornay-Barrachina et al., 2012).

7. Relationships / Networking: The ability to build alliances is directly related with the

development of new products and/or services (Pittaway et al, 2004; Dotzel et al., 2013). The openness to relationships (through networks, alliances or other forms of connections) allows the creation of crucial knowledge for successful innovation (Panayides, 2006; Lasagni, 2012).

8. Technological infrastructure for innovation: The firm's technological resources allow it to shorten development time and to exploit the life cycle of the innovation in the market (Abecassis-Moedas & Benghozi, 2012). The adoption of information technologies affects the perceived risk (Dotzel et al., 2013), while reducing uncertainty in the innovation process (Freeman & Soete, 2009).

9. Measurement: The development of indicators to measure innovation performance is essential in a context where innovation and technology are essential elements of economic growth and social prosperity (Autant-Bernard et al., 2010; Rao, 2010).

10. Learning: Organizational learning is interrelated with innovation (Brockman, et al., 2012; Mieres, et al., 2012). It is a key element for organizational innovation, especially in knowledge intensive industries, and this often becomes a source of sustainable and competitive advantage (Liao et al., 2012).

These internal dimensions of OI should be connected with the measurement of results, particularly those related to innovative performance, both for elements that are directly linked to the production process (products, services and processes), and for organizational improvements. The model includes five indicators that are commonly used to measure innovation in products, services, and processes:

1. Products/services perceived as innovative by the market (Uzkurt et al., 2012; Autant-Bernard et al., 2010);
2. Significant reductions in development time of products/services/processes (Pushpa & Mathew, 2012; Abecassis-Moedas & Benghozi, 2012);
3. Number of products or services launched, compared to competitors (Rubera & Kirca, 2012; Brockman et al., 2012, P. 445);
4. Speed of change in production methods, compared competitors (Dabla-Norris et al., 2012);
5. Share of the firm's total revenue in comparison with the industry average (Oke et al., 2012; Dabla-Norris et al., 2012).

Measures of organizational improvements involve the following:

1. Number of organizational improvements that are implemented as a result of suggestions received (Remneland-Wikhamn & Wikhamn, 2011);
2. Significant improvements in process parameters, such as quality, cost, development time, reliability, and capacity (Dabla-Norris, et al., 2012; Cepeda-Carrion, et al., 2012);
3. Significant progress in the financial, operational, and strategic perspectives of the business, as well as development of competences (Sawang & Unsworth, 2011);
4. Significant improvements in marketing.

Therefore, the proposed theoretical model combines the ten dimensions in order to explain the innovative performance, which comprises five indicators connected to production (products, services, and processes), and four indicators related to organizational improvements. It should be emphasized that the conceptual model presented is restricted to the assessment of the internal dimensions that can be controlled by the organization to reinforce an innovative environment.

4. METHODOLOGY

In order to find the relationship between the OI dimensions and their impact on innovative performance, the variables were measured from a non-probabilistic sample of 204 medium and large-scale companies from manufacturing and services sectors, located in the Southern and Southeast regions of Brazil, which concentrate the largest share of the country's GDP. After the exclusion of four outlying cases, the effective sample comprised 200 companies, of which 65.5% are in manufacturing and 34.5% in services; 58.5% of the total are large-scale firms, and 41.5% are medium-sized.

The data collection instrument comprised 54 questions related to the ten dimensions of OI (5 to 7 questions for each dimension), and 9 questions related to innovation performance (5 questions for "product innovation" and 4 questions regarding "organizational innovation"). The questions were set up as statements, and respondents were asked to rate their perception on a scale from 0 to 10, in which 0 meant that item was completely absent in the organization, and 10 meant that the item was fully perceived. It should be noted that variables associated with innovation are often measured on the basis of the respondents' perception (Dotzel et al., 2013; Akgun et al., 2012; Uzkurt et al., 2012; Cepeda-Carrion et al., 2012). In this case, the researchers took steps to ensure that all respondents were qualified to assess the most relevant aspects of the organization, particularly its innovation activities.

The data were analyzed using canonical correlation analysis, which is a multivariate analysis of correlation between two sets of multiple independent and multiple dependent variables, that is, between a linear combination of a set of Y variables and a linear combination of a set of X variables. In its general form, this can be expressed by the following equation, where Yi represents dependent variables and Xi stands for independent variables:

$$Y_1 \dots Y_q = f(X_1 \dots X_q) \tag{1}$$

The set of variables can be represented by a system of equations based on the following presentation, in which where a_q and b_q are variable coefficients:

$$W_m = a_{m1}X_1 + a_{m2}X_2 + \cdots + a_{mq}X_q \tag{2}$$

$$V_m = b_{m1}Y_1 + b_{m2}Y_2 + \cdots + b_{mq}Y_q \tag{3}$$

The objective, therefore, is to estimate the coefficients in a way that their respective canonical correlations (Cm) between Wm and Vm are maximized and those being: i ≠ j, C(Vi, Vj) = 0; C(Wi, Wj) = 0, and; C(Vi, Wj) = 0.

The analysis protocol followed the procedures described in Table 1.

Table 1 – Analysis Protocol

Stage	Objectives	Procedures	References
1. Pre-conditions	Detect the presence of outliers; Verify the minimum number of cases necessary for analysis	Mahalanobis d^2; Relationship between the number of cases and independent variables	Marôco (2010)
2. Reliability	Assess the internal reliability of questions submitted to respondents	Cronbach's Alpha	Cooper and Schindler (2003)
3. Differences	Detect differences in perceptions of OI and innovative performance	Mann-Whitney's U: differences between groups	Field (2009)
4. Assumptions	Assess the assumptions inherent to canonical correlation	Skewness and kurtosis: multivariate normality; Variance Inflation Factor (FIV): multicollinearity; White: homoscedasticity; Durbin-Watson: autocorrelation.	Marôco (2010), Fávero et al (2009); Briand & Hill (2011)
5. Estimation	Determine the canonical functions; Select functions for interpretation purposes.	Canonical R^2: determining individual canonical functions; Significance testing (Wilks, Pillai, Hotelling, and Roy): determining the set of canonical functions	Fávero *et al* (2009)
6. Interpretation	Verify the relative importance of each original variable on the canonical relationships	Redundancy index; Analysis of canonical loadings	Hair Jr *et al* (2010)
7. Validation	Ensure that interpretation of results is aligned with the analysis	Composition sensibility analysis	Hair Jr *et al* (2010).

Source: Own elaboration.

5. ANALYSIS AND DISCUSSION OF RESULTS

The first procedure was the verification of potential outliers, applying Mahalanobis distance, a statistical measure based on a chi-square distribution. In this case, seven cases were initially marked as outliers, with d^2 values above 38.15 and p-values below 0.000 (Marôco, 2010). After a careful empirical examination, four cases were excluded from the sample.

The second procedure dealt with construct reliability, considering the variables that compose each dimension of OI, as well as the innovation constructs. In all cases, the values of Cronbach's Alpha were greater than 0.85, so the constructs were considered consistent and reliable (Cooper & Schindler, 2003). In addition, the grouping of variables by dimension shows a relation of more than 10 cases per dimension, surpassing the minimum required for the employment of canonical correlation analysis, while precluding the negative impacts of very large samples, which tend to indicate statistical significance in all instances in this type of analysis (Hair Jr et al., 2010).

Regarding the intensity by which the intensity of the OI dimensions and innovation performance are perceived, Table 2 summarizes the results. Excepting the perception of organizational innovation, the average values of all the remaining variables were below the median, thus indicating a concentration of responses on the lower half of the perceptions of the items in the questionnaire.

Table 2 – Perceptions of OI dimensions and innovative performance

Dimension/Innovation	Minimum	Maximum	Median	Mean	Std. Deviation
Strategy	0.00	96.60	69.15	66.12	16.84
Leadership	10.00	97.10	68.50	66.75	16.27
Culture	6.60	92.80	70.00	67.26	16.21
Organizational structure	20.00	95.70	65.70	64.03	15.30
Process	15.00	96.60	68.30	65.50	16.05
People	2.50	98.00	68.30	63.42	18.00
Networking	4.00	98.00	68.30	66.28	17.39
Technological infrastructure	14.00	98.00	67.10	63.77	16.01
Measurement	10.00	100.00	65.00	62.14	17.97
Learning	6.00	97.10	65.70	65.26	15.27
Innovative products/services	6.00	100.00	64.00	63.56	17.85
Organizational innovation	13.30	100.00	65.00	65.21	17.20

Source: Own elaboration, from analysis of survey data.

The next step was to verify whether the data meet the basic assumptions for canonical correlation analysis. Regarding data normality, the absolute values for skewness were below 2 (the largest value was -0.979), and below 7 for kurtosis (the largest value was 1.382), indicating that the data approximate a normal distribution (Marôco, 2010). In the evaluation of multicollinearity, the Variance Inflation Factor, which measures how much the variance of an estimated regression coefficient increases if the predictors are correlated, did not indicate any dimension with a factor above 10 (the highest value was 6.799, for the "Learning" dimension), thus excluding problems in that aspect (Pestana & Gageiro, 2005). The Durbin-Watson statistic was used to test for the presence of autocorrelation in the residuals from the statistical regression analyses. It presented a value of 1.255 for the regression between OI dimensions and product innovation, and 1.765 for organizational innovation, thus both values were in the region of non-rejection of nonexistent autocorrelation (Marôco, 2003). Even so, it should be noted that, since there is no logic in the data disposition, this assumption can be relaxed (Machado & Machado, 2011).

The White test detected problems regarding the assumption of homoscedasticity (Briand & Hill, 2011). For the variable "Product Innovation", the values were $X^2(65) = 153.9878$; p-value < 0.000 and for "Organizational Innovation", $X^2(65) = 109.0055$; p-value < 0.000. The evaluation of residuals in dispersion plots for both multiple regressions did not point to patterns that are commonly associated with heteroscedasticity. Hence simple regressions were performed with each of the dimensions, and the analysis of dispersion plots did not reveal any significant patterns. On the other hand, in the simple regressions, the White test indicates heteroscedasticity in three independent variables: the "People" dimension, both in association with "Product Innovation" ($X^2(2) = 7.7489$; p-value < 0.021), and with "Organizational Innovation" ($X^2(2) = 11.4567$; p-value < 0.003); the "Mensuration" dimension, with "Product Innovation" ($X^2(2) = 13.5125$; p-value < 0.001), and "Organizational Innovations" ($X^2(2) = 6.4669$; p-value < 0.039); and "Learning" as an independent variable of "Product Innovation" ($X^2(2) = 7.1463$; p-value < 0.028). Even with the application of the transformations proposed by Hair Jr et al. (2010), the issue remained. Therefore, the option was to proceed to a robust canonical correlation based on the rank covariance matrix, as suggested by Visuri et al. (2000) and Dehon et al. (2000). Linearity was not tested for the sets of data, on the assumption that, if the variables are non-linearly related, the relations would not be captured by the canonical correlation (Hair Jr et al, 2010).

The next step was the determination of the canonical functions. Initially, it verified whether both sets of canonical functions, composed by the two variables associated with innovation, are fit to be included in the interpretation of results. The significances of each of the canonical functions, or variates, are displayed in Table 3.

Table 3 – Overall Model fit

Canonical Function	Canonical correlation (R)	Canonical R^2	F Test	p-value
1	0.88992	0.79196	28.10931	0.000
2	0.47746	0.22797	6.20101	0.001

Source: Own elaboration, from analysis of survey data.

The results indicate that the canonical correlations are statistically expressive. Simultaneously, the significance tests presented in Table 4 indicate that the canonical functions are also statistically significant.

Table 4 – Significance tests

Statistic	Value	F test	p-value
Wilks' lambda	0.16062	28.10931	0.000
Pillai's trace	1.01992	19.66836	0.000
Hotelling's trace	4.10187	38.35250	0.000
Roy's gcr	0.79195		

Source: Own elaboration, from analysis of survey data.

It is also necessary to determine the amount of the dependent variable variance accounted for or shared with the independent variables. For this purpose, the redundancy index provides a summary measure of the ability of the independent variables (taken as a set) to explain variation in the dependent variables (taken one at a time). It is obtained from the sum of the average variances in the functions multiplied by their respective canonical R2, as shown in Table 5.

Table 5 – Redundancy indexes

Canonical function	Average variance	Canonical R^2	Redundancy index
1	0.94056	0.79196	0.74489
2	0.05944	0.22797	0.01355

Source: Own elaboration, from analysis of survey data.

The values of the redundancy indices indicate that the variables related to OI dimensions can explain 75.84% of the variance in the set of variables associated to innovation results. It is also observed that the values for the first function are quite significant. As for the second function, the results only confirm the ones from the overall model fit, and have little practical significance.

The interpretation of the results also involves the analysis of canonical functions with the purpose of determining the relative contribution of each observed variable. The canonical loading can be interpreted like a factor loading in assessing the relative contribution of each variable to each canonical function, in this case “Product Innovation” and “Organizational Innovation”, as shown in Table 6.

Table 6 – Canonical loadings of dependent variables

Canonical function	Product Innovation	Organizational Innovation
1	0.97618	0.96343
2	-0.21696	0.26796

Source: Own elaboration, from analysis of survey data.

The results show that innovative performance, both in terms of product innovation and organizational innovation, display loadings that result in high shared variance, explaining at least 92.82% of the variation in the canonical variable (for the performance associated with organizational innovation), and 95.29% (for product innovation). These values suggest that both measures are representative of innovative performance. The canonical loadings for the variables that represent the OI dimensions are shown in Table 7.

Table 7 – Canonical loadings of independent variables

F.	Strat.	Lead.	Cult.	Struct.	Proc.	People	Netwrk.	Techn.	Mens.	Learn.
1	0.735	0.795	0.811	0.736	0.793	0.833	0.818	0.635	0.705	0.982
2	0.220	0.123	-0.007	-0.052	-0.042	0.370	-0.037	-0.364	-0.114	-0.025

Source: Own elaboration, from analysis of survey data.

In the first function, there are significant results, indicating that, among the innovativeness dimensions, “Learning”, “People”, “Networking”, “Culture” and “Leadership” provide a high contribution to the innovation performance variables. The explanatory power for the first canonical function, evaluated in terms of each dimension, is 96.38% for “Learning”, 69.39% for “People”, 66.90% for “Networking”, 65.76% for “Culture”, 63.27% for “Leadership”, 62.95% for “Processes”, 54.16% for “Organizational Structure”, 54,06% for “Strategy”, 49,65% for “Mensuration” e, 40,36% for “Technological Infrastructure”. Figure 1 illustrates the dimensions.

As a final step, the validation of results is performed by applying the sensitivity analysis, which consists in eliminating, one by one, the independent variables (OI dimensions) and observing the stability of the overall canonical correlations. The results are displayed in Table 8. The values show stability, indicating that the interpretation of results based on canonical loadings is aligned with the previous analyses.

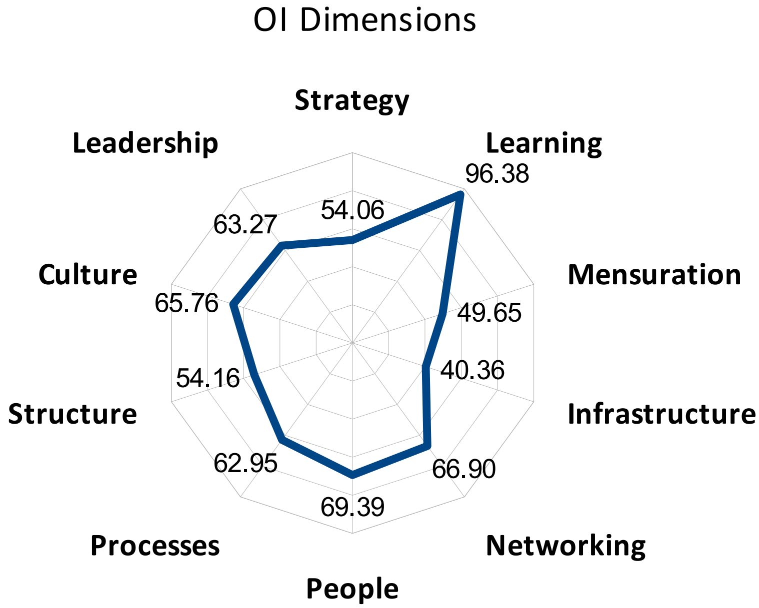
Table 8 – Stability analysis

Statistic	Strat.	Lead.	Cult.	Struct.	Proc.	People	Netwk.	Techn.	Mens.	Learn.
R	0.890	0.890	0.890	0.890	0.890	0.890	0.881	0.889	0.889	0.829
R^2	0.792	0.791	0.792	0.791	0.791	0.792	0.777	0.791	0.790	0.688

Source: Own elaboration, from analysis of survey data.

The canonical correlation analysis reveals that the sets of variables composed by the dimensions of OI and by the components of innovative performance are not independent. The association among the groups are established mainly by the “Learning”, “People”, “Networking”, “Culture” and “Leadership” dimensions. Regarding the dependent variables, both the “Organizational Innovation” and “Product Innovation” display strong relationships with the OI dimensions. It should also be noted that they are strongly interrelated and are representative of innovative performance.

Figure 1 – Explanatory power of Organizational Innovativeness (OI) Dimensions



Source: Own elaboration, from analysis of survey data.

The results, as shown in Table 7 and Figure 1, highlight the importance of the "Learning" dimension of OI in this survey. Previous research by Hurley and Hult (1998) and Baker and Sinkula (1999) pointed to a positive relationship between learning orientation and firm performance – expressed by market share, new product success, and overall performance. As Calantone, Cavusgil and Zhao (2002, p. 522) suggested later, "innovation itself is a broad process of learning that enables the implementation of new ideas, products, or processes," noting that "if learning orientation is considered as the input, then firm innovativeness can be viewed as the output of learning efforts."

The results are also supported by findings of subsequent studies. For example, Yeung, Lai and Yee (2007) indicate that organizational learning hinges on senior management support, as well as an appropriate learning infrastructure and culture, leading to organizational efficiency. Pablo González del Campo and Škerlavaj (2009) found that organizational learning has a strong positive impact on process, product, and service innovations in a study of 107 Spanish companies. Rhee, Park and Lee (2010) analyzed 333 technology-innovative firms in South Korea, and found that learning orientation significantly affects innovativeness. Their findings also imply that managers with entrepreneurial orientation and market orientation should emphasize learning orientation in order to boost innovativeness and ultimately achieve performance. Nybakk (2012) confirmed that learning orientation has a positive effect on firm innovativeness. In addition, learning was found to positively affect financial performance via the full mediating effect of firm innovativeness. The connection of other dimensions of OI – such as human resources policies, networking, culture and leadership – with innovation results is also supported by the literature. For example, Pablo González del Campo and Škerlavaj (2009) point out the indirect impact of organizational learning on innovation, via innovative culture.

Lastly, it should be highlighted that the model displayed an ability to explain 95.3% of the variation in innovative performance in connection with innovation in products and services, and 92.8% regarding organizational improvements. In the aggregate, the variance in the ten dimensions explains 75.8% of the variance in innovative performance. This indicates a high degree of coherence in the model's dimensions. On the other hand, it suggests the existence of other potential dimensions that could account for the remaining unexplained variance.

6. CONCLUSION

This study aimed to develop a theoretical model that identifies OI dimensions, and to verify empirically the model's capacity to evaluate the impact of such dimensions on innovative performance. The application of the model to a sample of 200 medium-sized and large companies offers some contributions for both academic research and practical applications. These results are coherent with several studies, such as Claußs (2012), Liao et al. (2012) and Vacaro et al. (2012). However, this study moves beyond the overviews of enabling factors, and sought to investigate to what extent each one of them explains innovative performance. The prominence of the contribution of the "Learning" dimension of OI to innovative performance is particularly emphasized.

With regard to practical contributions, the findings suggest that organizational-level analyses are essential to capture the dynamic dimensions of innovative practice that are not captured by aggregated input and output indicators. As Borjesson and Elmquist (2011) suggest, there is a need for more in-depth research on how organizational capabilities for innovation are developed in practice. In that sense, the managerial implications may be further explored in studies that address specific practices and processes in each dimension of innovativeness, for a more detailed evaluation of the relationships among those elements. Moreover, the wide variations in OI and innovation results that exist among firms also highlight the need for more case-based research. More generally, the proposed model opens new opportunities of investigation about the relations between innovativeness and other business practices or organizational characteristics, thus contributing to theoretical and practical advancements in the area.

Among the limitations of this study, it is clearly at an exploratory stage, testing a new model in a specific context. This may limit the generalization of the findings, although Brazil, and more specifically its more developed regions, share many characteristics with other emerging economies in terms of technology development, managerial practices and market conditions. To mitigate this issue, widely used constructs and variables that have been validated in other studies were included in the model, whenever possible. Further research should corroborate the validity of these findings in other developing and developed markets.

Another aspect to be considered is related to self-report data and whether an individual response is representative of firm-level characteristics and situations, a common issue in organizational-level studies. To mitigate this problem, the survey targeted top-level managers who are familiar with the topic to complete the questionnaire. Future research can benefit from using more objective measures for some of the variables, or indicators that could be independently verified.

Additionally, one should view the results within the limitations of canonical correlation analysis as a technique. Canonical correlation places few restrictions on the types of data on which it operates, thus it tends to be regarded as inferior to other techniques that impose more rigid restrictions. In addition, there are few diagnostic procedures developed specifically to interpret canonical analysis. However, as Hair Jr. et al. (2010) point out, canonical correlation represents a useful tool for multivariate analysis, and it is the most appropriate and powerful multivariate technique in situations with multiple dependent and independent variables. Again, considering the exploratory nature of this research, the chosen method is also useful to refine the model and lead to future models that can represent the most significant variables and their relationships with a higher degree of certainty.

Nevertheless, the findings point to a decisive role of the proposed OI dimensions in relation to innovative performance. More specifically, they indicate the key role of organizational learning for the achievement of innovation results. Other dimensions also appear as important elements of OI, particularly innovation-oriented human resource policies, organizational culture and leadership, as well as the ability of the firm to exploit is external relationships and processes to leverage its knowledge assets for innovation. Taken together, these elements explain a significant proportion of innovative performance in the companies surveyed.

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